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TRANSACTIONS

OF THE

SOCIETY FOR BRITISH ENTOMOLOGY

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TRANSACTIONS OF THE SOCIETY FOR BRITISH ENTOMOLOGY

VOL. 8. 29TH MARCH, 1943. PART 4.

NEW AND LITTLE-KNOWN SPECIES OF BRITISH TYPHLOCYBIDAE (HOMOPTERA) WITH KEYS TO THE GENERA *TYPHLOCYBA*, *ERYTHRONEURA*, *DIKRANEURA*, *NOTUS*, *EMPOASCA* AND *ALEBRA*.

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Department of Entomology, British Museum (Nat. Hist.).

The publication of Ribaut's excellent monograph of the Typhlocybidae of France has acted as a spur to the study of the British forms. Using this work it has been easy to identify British material, and the tendency has been sometimes to record as new to Britain species described by Ribaut and not hitherto contained in the British list. It must be remembered, however, that no less than fifteen species on the British list were not recorded from France by Ribaut. It has been obvious that so many British species were unlikely to be absent from France and it has seemed just as unlikely that, if present, Ribaut would have failed to discover them. One had, therefore, to conclude that in some cases at least Ribaut was misled as to the identity of these species by Edwards' inaccurate figures of the genitalia.

In order to remove this source of error I have carefully studied each of the fifteen British species not recorded by Ribaut from France, making proper microscopical preparations of the genitalia of each type specimen where possible. Edwards' drawings were always made from dry dissections, so that they suffered from inaccuracy due to the impossibility of getting a sufficiently high magnification. Ribaut, on the other hand, examined his dissections in glycerine jelly and was consequently able to use the monocular microscope. His drawings attain a standard of accuracy unequalled by any other workers on this group. As a result of my study I find that of the above fifteen species only six, *T. carri* Edw., *T. tersa* Edw., *T. crataegi* Dougl., *T. prunicola* Edw., *T. alnicola* Edw. and *E. simplex* Edw., are truly distinct

species not found in France, and of these one, *T. prunicola* Edw., is indistinguishable from *T. barbata* Ribaut except by slight differences in the lateral lobes of the pygophor; another, *T. crataegi* Dougl., is distinguishable from *T. froggatti* Baker only by the longer and differently directed lateral appendages of the aedeagus; while *E. simplex* may be a pathological form of *E. collina*. Of the remaining nine species, three are pathological specimens with distorted genitalia due to parasitisation of the nymph, while six are synonymous with species recorded by Ribaut, one, *T. pruni* Edw., having been described by Edwards in the wrong genus.

Two species are herein added to the British list. In order to help students to identify the British species in their revised form, I have attempted to produce keys to the British species of *Typhlocyba, Erythroneura, Dikraneura, Notus, Empoasca* and *Alebra,* based on Ribaut's synopsis of the French fauna but including the additional species mentioned above. I have omitted from the *Typhlocyba* key the pathological form (*T. complicata* Edw.) which cannot be identified with any normal form. I have been unable to identify Curtis' species, the types, if they still exist, being in the Museum at Melbourne, Australia.

Genus **Typhlocyba** Germar, 1833

(= *Empoa* Fitch, 1851 = *Anomia* Fieber, 1866 = *Edwardsiana* Zachv., 1929).

1. *Typhlocyba frustrator* Edwards, 1908 (fig. 1 a-c).

1908, *Typhlocyba frustrator* Edwards, *Ent. mon. Mag.*, **44**: 84, figs. 6-7.
1928, *Anomia frustrator* Edwards, *Ent. mon. Mag.*, **64**: 82.
1931, *Typhlocyba solearis* Ribaut, *Bull. Soc. Hist. nat. Toulouse,* **61**: 339, figs. 22-26 (**syn. nov.**).
1936, *Typhlocyba solearis* Ribaut, Faune France, **31**, Homopt. Auchen. 1, Typhlocybidae: 98, figs. 220-221.

In October, 1940, Dr. A. M. Massee collected a number of specimens of a Typhlocybid on sweet chestnut at East Malling, Kent, which he identified with the aid of Ribaut's monograph as *Typhlocyba solearis* Ribaut. Some specimens were sent to me for identification and I confirmed Dr. Massee's determination. Now Ribaut in his description likens the genitalia in *T. solearis* to those in *T. frustrator* Edw., which does not occur in France. When, however, I came to record *T. solearis* as new to Britain, I decided it was necessary to figure the genitalia of its ally, *T. frustrator*, for comparison. I at once found on boiling one of Edwards' specimens in potash that the genitalia were identical with those as figured by Ribaut for *T. solearis*. Ribaut had been misled by Edwards' inaccurate figures. In *T. frustrator* the extremity of the stem of the penis is not inflated as shown by

Edwards, nor is the common trunk of the anterior branch dilated. In potashed specimens the anterior appendages are at right angles to the axis of the penis and not bent down towards its base, as supposed by Ribaut. The only differences between Edwards' species and Ribaut's description are that in *T. frustrator* the head, pronotum and scutellum are whitish and the tegmina chrome-yellow, whereas Ribaut says of his species, pale yellow. This is explained by the fact that whereas Edwards

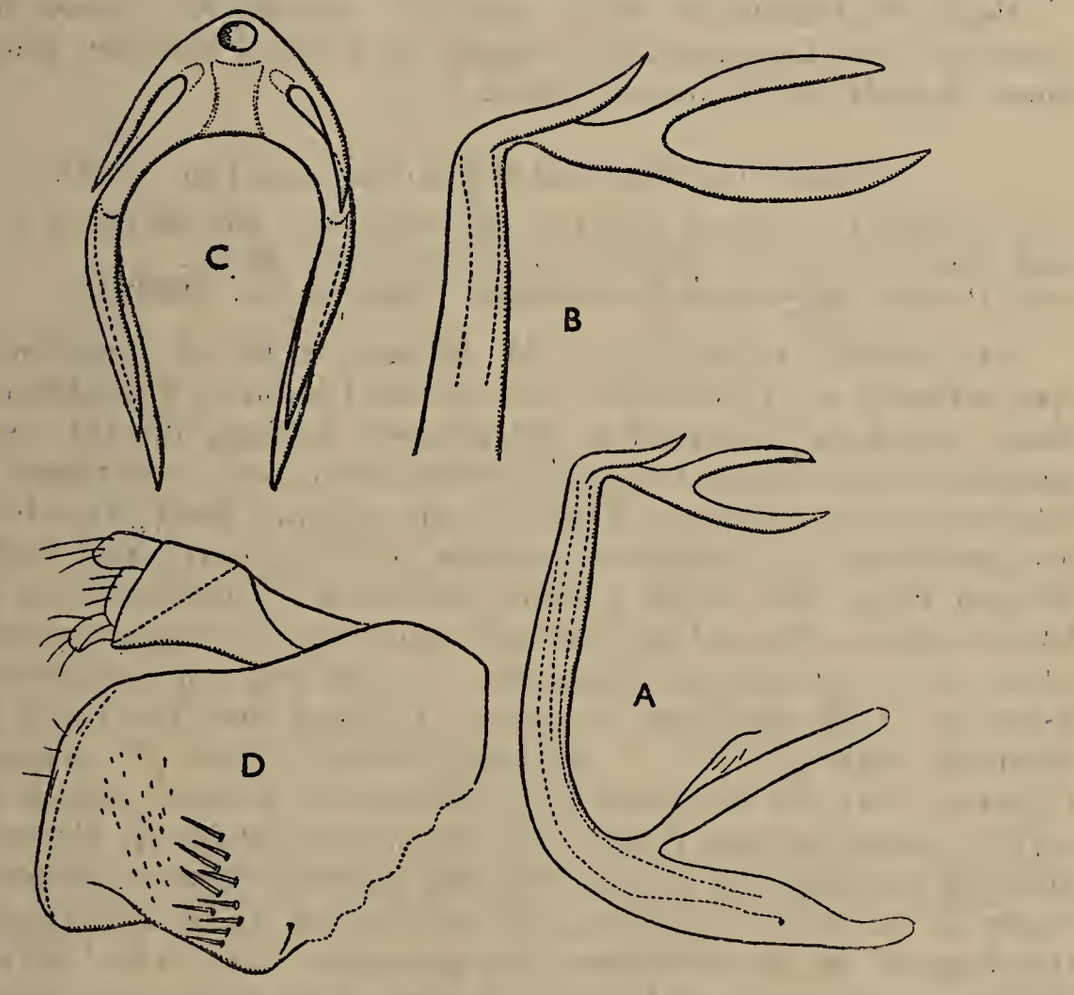

FIG. 1.—*Typhlocyba frustrator* Edwards, ♂. a, Lateral view of penis from the right; b, enlarged lateral view of apical appendages of penis from the right; c, terminal view of apical appendages of penis; d, lateral view of pygophor from the right.

described his species from mature, fully coloured examples, Ribaut must have described his from partly teneral or immature adults. There can be no doubt that the two species are identical.

In specimens dissected dry, as is the custom amongst British collectors, the two arms of each branch of the four anterior appendages do not lie in the same vertical plane, as shown in Ribaut's figures of *T. solearis,* but the lower arm bends inwards towards its opposite number, but Ribaut's figures and descriptions were made from cleared specimens, and if such technique is applied, the genitalia of British specimens of *T. frustrator* are identical

with those of *T. solearis* Ribaut, which, therefore, becomes a synonym of Edwards' species.

Recorded by Edwards from beech and elm in Norfolk and Gloucestershire. Recorded in France from the cultivated plum in spring and from nut bushes in spring and summer. Taken by Dr. A. M. Massee in some numbers on sweet chestnut at East Malling, Kent, 7.x.1940, and by Mr. P. Harwood near Wimborne, Dorset, on both nut, 30.vi.1940, and sycamore, 20.ix.1940.

Both *T. frustrator* Edw. and *T. solearis* Rib. have been recorded from Germany by Wagner as distinct species. One of these records needs investigation.

2. *Typhlocyba prunicola* Edwards, 1914 (fig. 2 a-d).

1914, *Typhlocyba prunicola* Edwards, *Ent. mon. Mag.*, **50**: 168, figs. a, b.
1928, *Anomia prunicola* Edwards, *Ent. mon. Mag.*, **64**: 82.
1939, *Typhlocyba prunicola* Ossiannilsson, *Opuscula Ent.*, **1939**: 26.

In October, 1940, Dr. A. M. Massee collected a number of specimens of a Typhlocybid on cultivated plum at East Malling, Kent, which he identified as *Typhlocyba barbata* Ribaut. Some specimens were sent to me for identification, and I confirmed Dr. Massee's determination. Ribaut in his original description likens the genitalia in *T. barbata* to those in *T. solearis* Rib. and *T. diversa* Edw. But when I came to record *T. barbata* as a new British species I found that the genitalia more strongly resembled those of *T. prunicola* Edwards. On boiling the genitalia of Edwards' type specimen in potash I found that the penis was identical with that of *T. barbata* Ribaut. Now *T. prunicola* Edwards was not recorded from France by Ribaut, and at first sight it appeared that Ribaut had again been misled by Edwards' poor figures and had redescribed the Edwards species under the name *T. barbata*. There is, however, some slight difference in the shape of the lateral lobes of the pygophor (fig. 2 d & e) between British specimens and French specimens as figured by Ribaut. This difference may be partly due to different viewpoint or even variation. British specimens seem to be constant in this respect, but I am unable to say whether the same holds good with French specimens. One would tend to ignore this difference if it were not for the fact that French specimens have been recorded only from willows, while British specimens have only been recorded from plum. This may of course be accidental; many Typhlocybid species occur on a variety of hosts. Nevertheless, I have refrained from synonymising *T. barbata* Ribaut under *T. prunicola* Edwards and have preferred to regard it as a subspecies of *T. prunicola* Edw. The British list is not affected, since Massee's specimens are undoubtedly identical with Edwards' type and not with *T. barbata* Ribaut. *T. prunicola* Edw. varies in colour from yellowish-white to deep yellow in some October specimens,

Recorded by Edwards from cultivated plum, 17th July. Dr. Massee took it in some numbers on cultivated plum at East Malling, Kent, 15.x.1940. Ossiannilsson has recorded it from plum in Sweden.

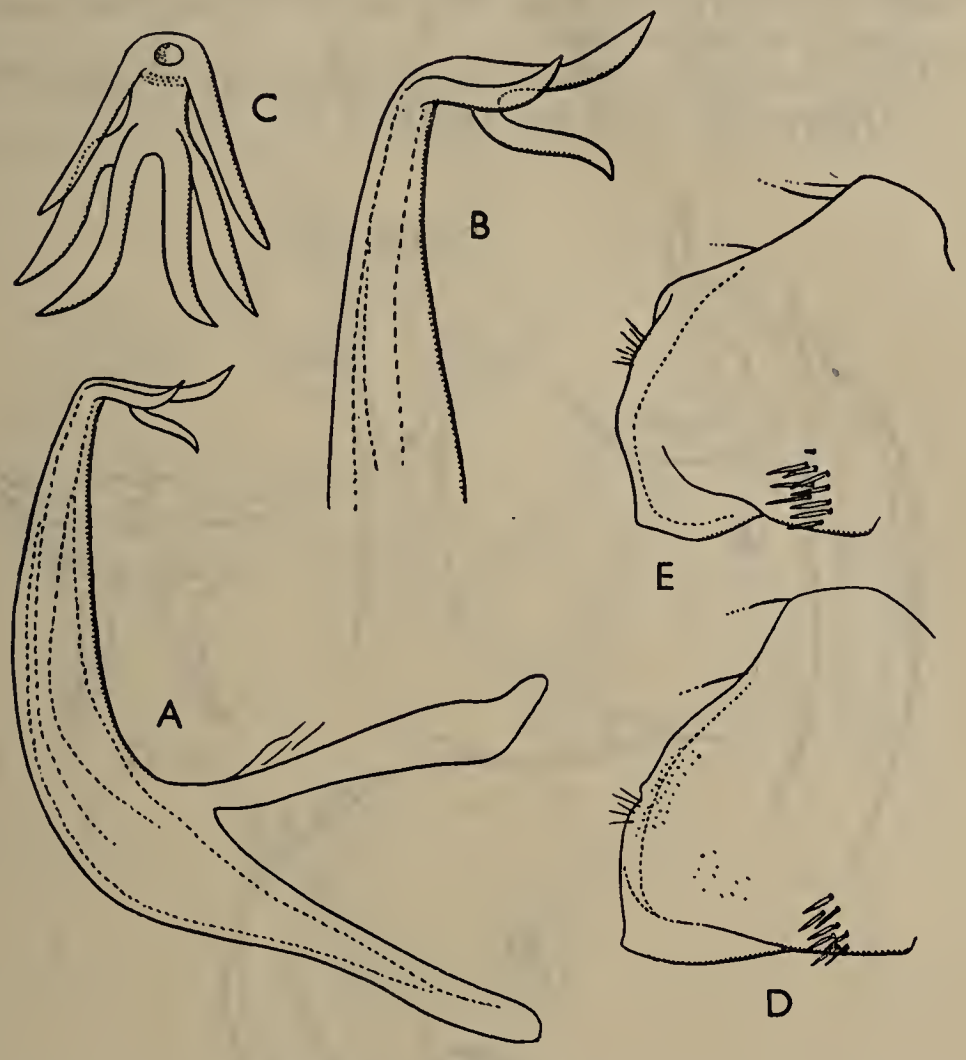

FIG. 2.—*Typhlocyba prunicola prunicola* Edwards, ♂. a, Lateral view of penis from the right; b, enlarged lateral view of apical appendages of penis from the right; c, terminal view of apical appendages of penis; d, lateral view of pygophor from the right.

Typhlocyba prunicola barbata Ribaut, ♂. e, Latteral view of pygophor from the right.

2A. *Typhlocyba prunicola barbata* Ribaut (fig. 2e).

1931, *Typhlocyba barbata* Ribaut, *Bull. Soc. Hist. nat. Toulouse,* **61**: 338, figs. 17-21 (**syn. nov.**).

1935, *Typhlocyba barbata* Wagner, *Verhandl. Ver. naturw. Heimatforschung Hamburg,* **24**: 32.

1936, *Typhlocyba barbata* Ribaut, Faune France, **31**: Homopt. Auchen. 1, Typhlocybidae: 100, figs. 228-229.

Recorded from France by Ribaut on various species of willow. *T. barbata* Rib. was recorded by Wagner from England in 1935, but this record needs verification and may refer to *T. prunicola* Edw. *T. barbata* Ribaut is closely allied to *T. tersa* Edwards (q.v.), also recorded from Britain on willows.

3. *Typhlocyba plebeja* Edwards, 1914 (fig. 3 a-d).

1914, *Typhlocyba plebeja* Edwards, *Ent. mon. Mag.*, **50**: 169, figs.
1928, *Anomia plebeja* Edwards, *Ent. mon. Mag.*, **64**: 82.
1931, *Typhlocyba divergens* Ribaut, *Bull. Soc. Hist. nat. Toulouse*, **61**: 339, figs. 27-32 (**syn. nov.**).
1936, *Typhlocyba divergens* Ribaut, Faune France, **31**, Homopt. Auchen. 1, Typhlocybidae: 102, figs. 233-236.

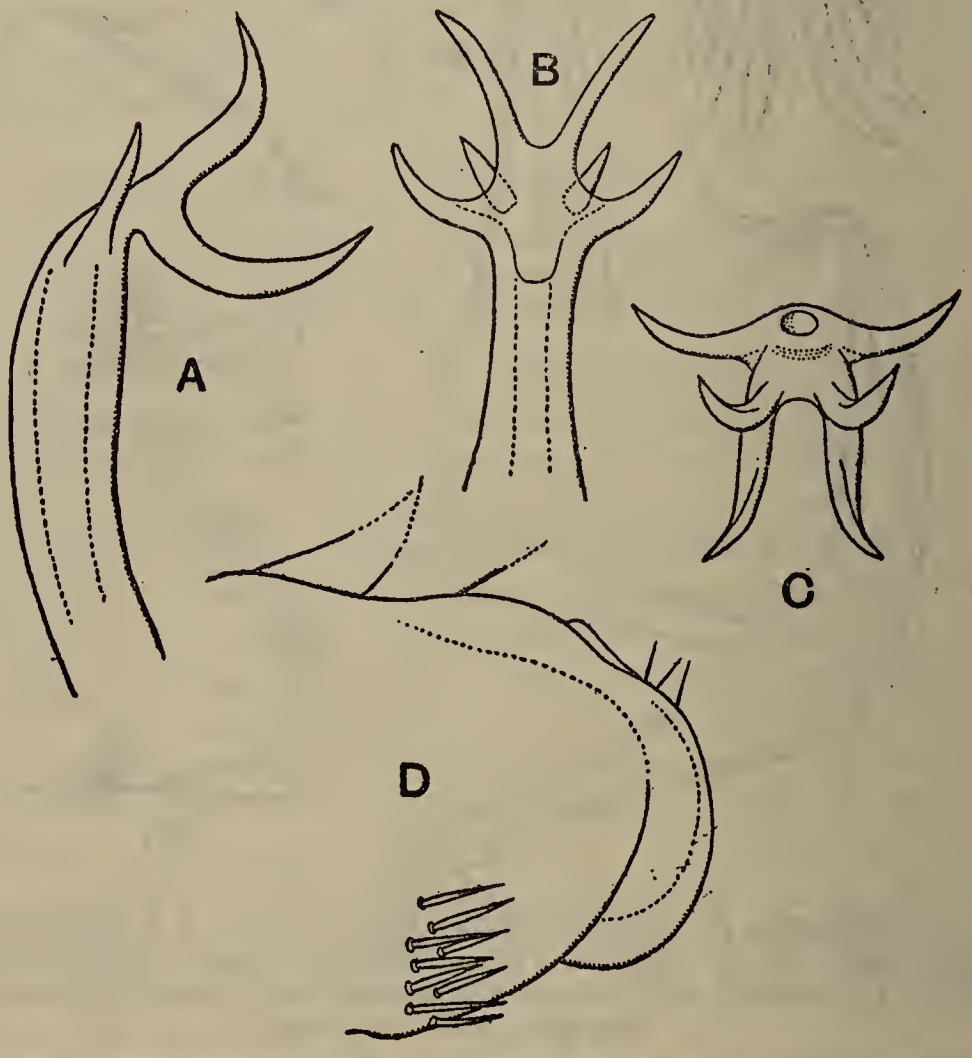

Fig. 3.—*Typhlocyba plebeja* Edwards, ♂. a, Lateral view of apical appendages of penis from the right; b, postero-dorsal view of these appendages; c, terminal view of same; d, lateral view of pygophor from the left.

This is another example of Ribaut being misled by Edwards' poor figures. An examination of Edwards' type shows that the genitalia are identical with Ribaut's description and figures. Ribaut recognised the fact that his species was very closely allied to *P. plebeja* Edw. and actually stated differences. These were based on Edwards' inaccurate figures and are not valid. The length of the appendages of the penis, however, vary somewhat in length, and in some paratype specimens they are somewhat longer than as shown in Ribaut's figures of *T. divergens*, and in this respect more nearly resemble Edwards' figures. Edwards records it from oak, lime, alder, elm and hazel in Nottingham-

shire. Ribaut gives elm as the sole food-plant in France. Occurs in Germany on elm (Wagner) and in Sweden on horse chestnut (Ossiannilsson).

4. *Typhlocyba lanternae* Wagner, 1937 (fig. 4a-c).

1937, *Typhlocyba lanternae* Wagner, *Verh. Ver. naturw. Heimatforschung Hamburg*, **26**: 154, figs. 1-3.

1939, *Typhlocyba lanternae* Ossiannilsson, *Opuscula Ent.*, **1939**: 26.

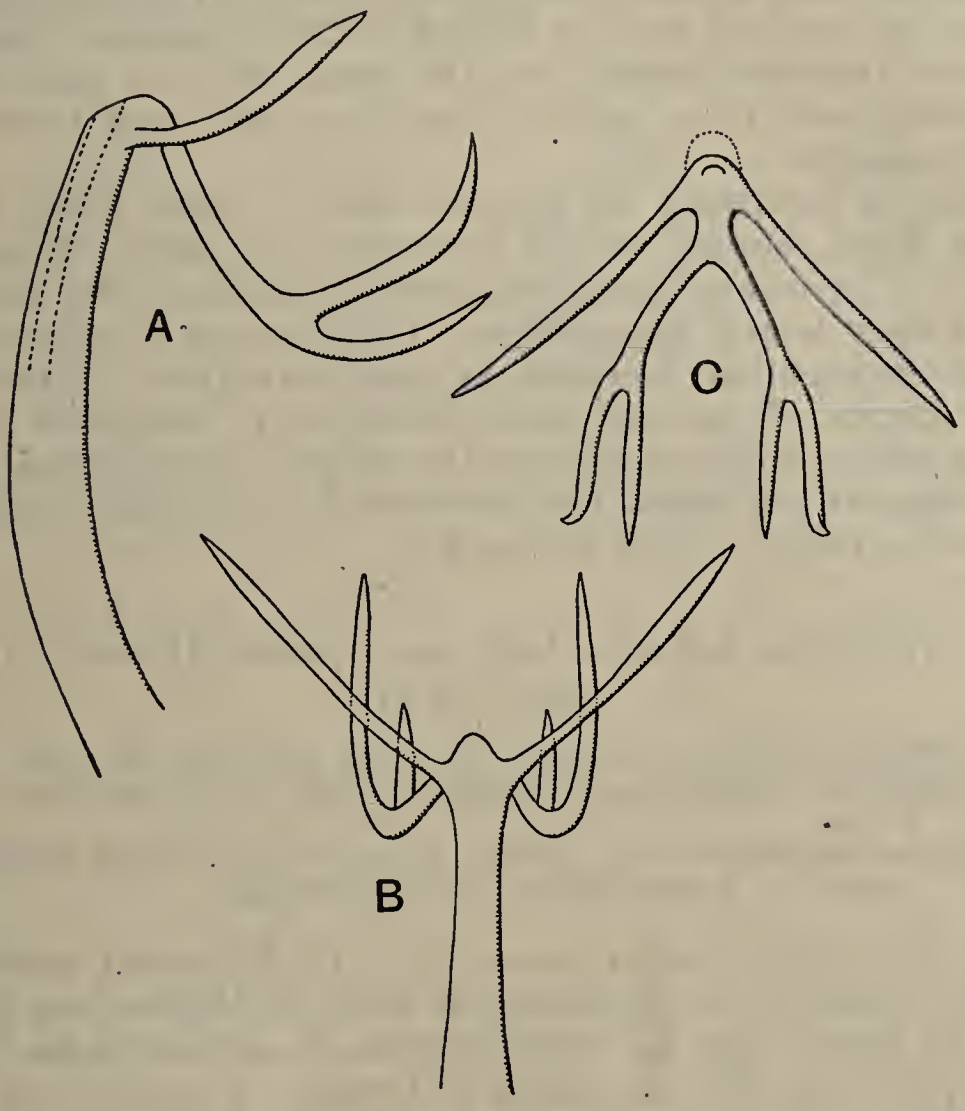

FIG. 4.—*Typhlocyba lanternae* Wager, ♂. a, Lateral view of apical appendages of penis from the right; b, postero-dorsal view of same; c, terminal view of same.

On the 20th October, 1940, Mr. P. Harwood took on alder in the New Forest, Hampshire, a pale yellow *Typhlocyba* belonging to the *T. rosae* group, which appeared to him to be a new species not described by Ribaut. It was sent to me for determination, and I was able to identify it as *Typhlocyba lanternae*, a species new to the British list, described some three years earlier by Wagner from two specimens taken at light by Herr Evers in the public park at Altona near Hamburg in Germany.

Description after Wagner:—Upper side pale yellow without markings. Stem of penis cylindrical, very slightly curved forwards. Apex of penis with four pairs of appendages, the side pair simple, the anterior pair branched. Lateral appendages very long; seen from behind and above appearing straight, forming a slightly obtuse angle with one another; seen from the side first directed towards the head (anteriorly) then feebly upwards. Anterior appendages very long, directed forwards and downwards up to the point of forking. The stem of the fork about as long as the outer branch; this branch directed obliquely upwards and curved so that its last fourth points upwards. The inner branch of the fork shorter than the outer, lower in level, almost horizontal, seen from the side feebly curved, seen from above almost straight.

Wagner compares his species with *T. tersa* Edw. and *T. diversa* Edw., but I consider it more nearly allied, in shape of penis, to *T. gratiosa* Boh., as figured by Ribaut, differing in the much longer lateral appendages. The absence of brown markings on the tegmina, however, at once distinguish it from Boheman's species. It is also closely allied to *T. bergmani* Tullgr., also on alder, differing only in the simple non-branched lateral appendages of the penis. Ossiannilsson has recorded *T. lanternae* Wagner as taken at light in Sweden.

5. *Typhlocyba pandellei* Leth. var. *spoliata* Horvath, 1907 (fig. 5c & d).

1878, *Typhlocyba pandellei* Lethierry, *C. R. Soc. ent. Belg.*, **21**: xxx.
1907, *Typhlocyba pandellei* var. *spoliata* Horvath, *Ann. Mus. Nat. Hung.*, **5**: 316.
1936, *Typhlocyba pandellei* var. *spoliata* Ribaut, Faune France, **31**, Homopt. Auchen. 1, Typhlocybidae: 114, figs. 283-284.

On the 13th October, 1940, Mr. P. Harwood collected a strange species of *Typhlocyba* on alder at Wimborne, Dorset, which he sent to me for identification. It proved to be *Typhlocyba pandellei* Leth. var. *spoliata* Horvath, a species new to the British list.

Description after Ribaut:—Length, 2.85-3.35 mm. Head, pronotum and scutellum yellowish-white. Tegmina variegated with whitish and golden-yellow. The typical form (not yet recorded from Britain) with a band of brick-red, sometimes turning to orange-yellow, on the anterior two-thirds of the commissural margin and on the posterior half of the clavus bordering the scutellum. This band is generally in the form of a triangle with its apex directed posteriorly, its inner side conforming with the inner claval margin, and its outer side parallel with the claval suture. Sometimes this band is reduced to a narrow strip along the margin of the scutellum and in var. *spoliata* (the form found

by Mr. Harwood in Dorset) it is entirely absent. The apex of the clavus is golden-yellow as is the median cell (supra-brachial of Edwards, 1896) and the external margin of the cubital cell (brachial of Edwards, 1896). In the male, the cubital cell is frequently entirely yellow, as are the posterior extremity of the radial and subcostal cells (subcostal and costal areas of Edwards, 1896). Apical cells and posterior extremity of cubital cell, and often also the extremities of the median and radial cells, strongly infuscate. Apical and transverse nervures whitish, well marked. Sternum pale, abdomen above black.

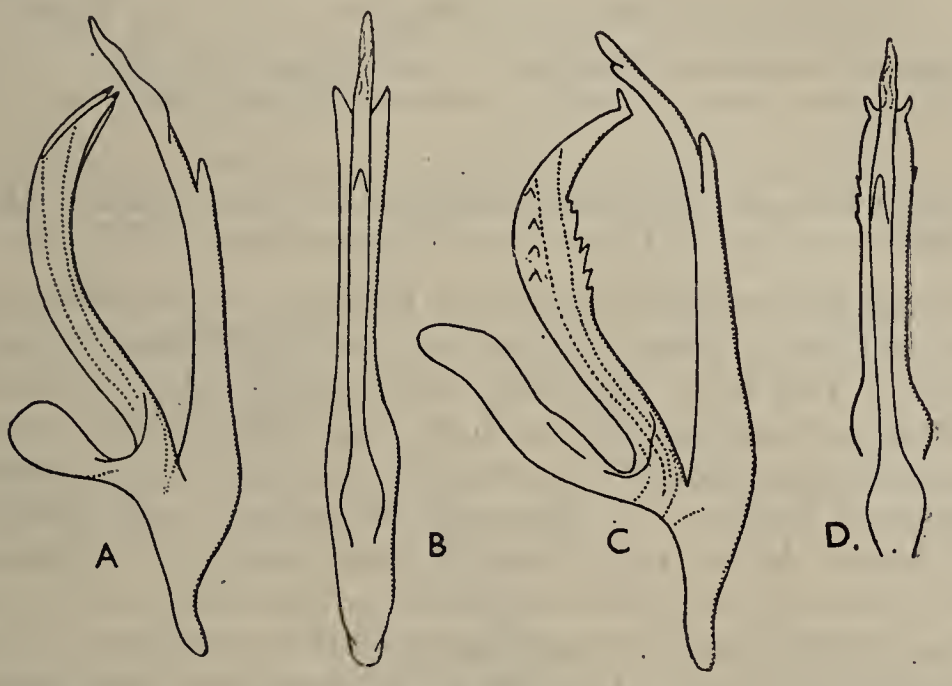

Fig. 5.—*Typhlocyba aurovittata* Douglas. a, Lateral view of penis from the left; b, postero-dorsal view of same.
Typhlocyba pandellei Lethierry. c, Lateral view of penis from the left; d, postero-dorsal view of same.

Penis in male resembling closely that of *T. aurovittata* Dougl. (fig. 5 a & b), from which it differs in the canaliferous region, which possesses a more or less distinct swelling of the part preceding the orifice, a number of spiniform tubercles irregularly dispersed over the swollen area and two small horns perpendicular to its axis, forming a crescent and directed anteriorly.

The variety *spoliata* Horvath has the same size and the same type of penis as the typical form. The clavus is yellow like the rest of the tegmen and is without the typical red band. It is impossible to distinguish this variety from *T. aurovittata* Douglas without an examination of the penis. At a pinch, the male can often be distinguished by the size (not more than 3 mm. in *T. pandellei* var. *spoliata* Horvath and not less than 3.25 mm. in *T. aurovittata*), by the yellow pigment less narrowly localised at the median cell, and that, by reason of the encroachment of pigment on the cubital cell, the claval suture is much less broadly

pallid. This limitation of the yellow pigment must be examined in daylight. In the female the distribution of the yellow pigmentation is of little value.

Recorded from France by Ribaut, chiefly on oak, but also from bramble and maple. Both the typical form and var. *spoliata* Horvath are found on oak in company with *T. aurovittata* Dgl. It is quite likely that *T. pandellei* var. *spoliata* has been confused with *T. aurovittata* by British workers, and an examination of their series of the latter species may reveal specimens of this new British species.

6. *Typhlocyba crataegi* Douglas, 1876 (fig. 6a-d).

1876, *Typhlocyba crataegi* Douglas, *Ent. mon. Mag.*, **12**: 203.
1896, *Typhlocyba crataegi* Edwards, Hemipt. Homopt. Brit. Is.: 215, pl. 25, fig. 3.
1928, *Anomia crataegi* Edwards, *Ent. mon. Mag.*, **64**: 81, fig. e.
1931, *Typhlocyba crataegi* Ribaut, *Bull. Soc. Hist. nat. Toulouse*, **61**: 336.
1937, *Typhlocyba crataegi* Ossiannilsson, *Opuscula Ent.*, **1937**: 24.

Strangely enough this common British species does not appear to occur in France, since it is not included by Ribaut in his Fauna, although it has been recorded from Sweden by Ossiannilsson. At first sight one would conclude that Ribaut had redescribed this species under another name and that his *T. oxyacanthae* (i.e. *T. froggatti* Baker = *T. australis* Froggatt) was probably the same species. In his 1931 paper Ribaut states: '*T. oxyacanthae* presents exactly the same external appearance as *T. crataegi* Douglas, 1876, but the appendages of the extremity of the penis have a different form.' He goes on to compare these appendages in the two species, basing his differences on Edwards' 1928 figures.[1] Since these latter are rather inaccurate judging by Ribaut's standards, I have thought it worth while to figure the penis of one of Douglas' males of *T. crataegi* side by side with that of *T. froggatti* (fig. 6e & f). It will be seen that the only real difference is the length and direction of the lateral appendages. The styles and the lateral lobes of the pygophor are identical. It is perhaps doubtful, therefore, if these are really distinct species. Both occur in Britain (vide China, *Ent. mon. Mag.*, **75**: 54), and it is most remarkable that the former should be absent from France. If *T. froggatti* had been absent from Britain one would have jumped to the conclusion that it was the continental subspecies of *T. crataegi*. On the other hand, if *T. crataegi* is eventually found in France, one would be justified, in view of the slight genital differences, in regarding *T. froggatti* as a form of the male of *T. crataegi*. It is, of course, possible that the two forms are really subspecies and that the French one has been introduced to Britain on cultivated fruit-trees in recent times. It has certainly

[1] Edwards' fig. f represents *T. froggatti* Baker.

been introduced to Australia and New Zealand in such a way.[2] For the time being, however, I propose to regard them as distinct species. Ossiannilsson has recorded *T. crataegi* Douglas from Sweden.

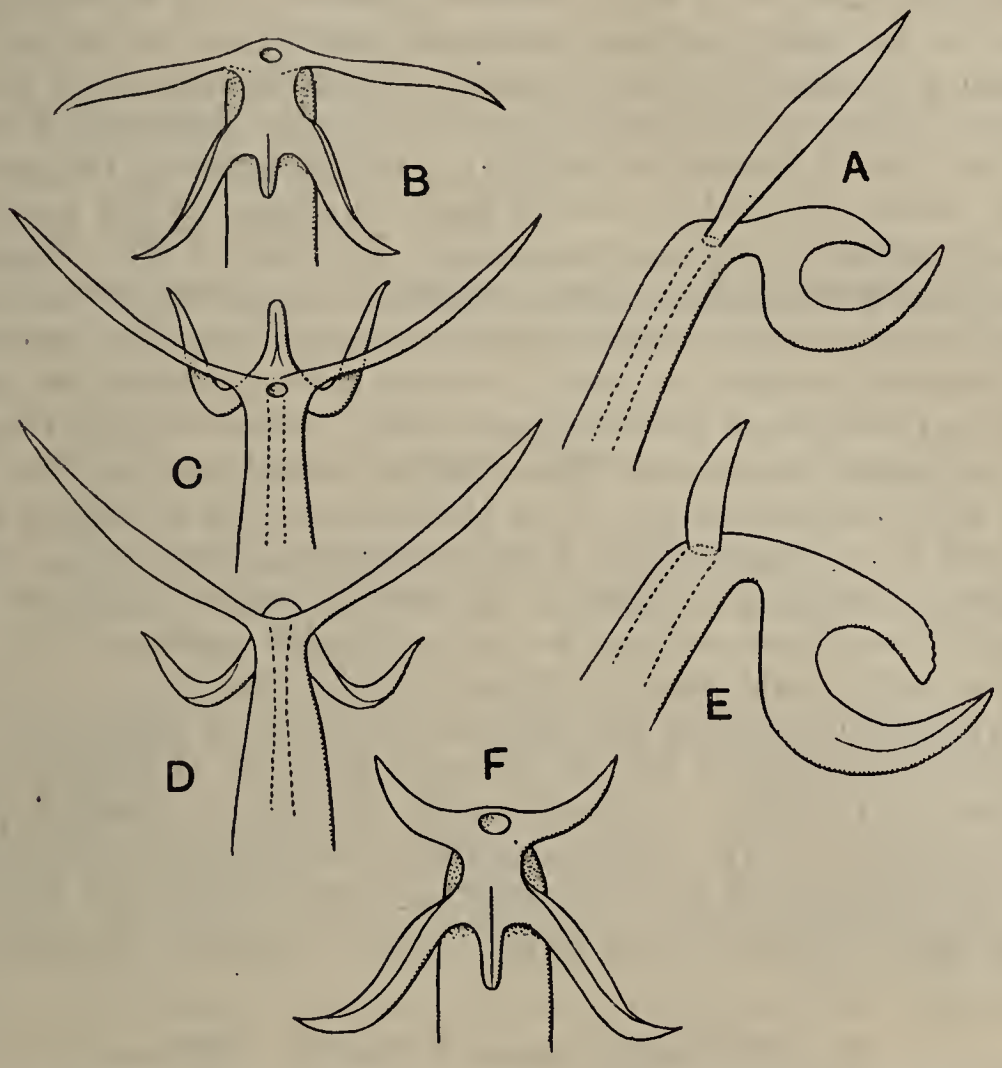

FIG. 6.—*Typhlocyba crataegi* Douglas. a, Lateral view of apical appendages of penis from the right; b, terminal view of same; c, postero-dorsal view of same; d, posterior view of same.
Typhlocyba froggatti Baker. e, Lateral view of apical appendages of penis from the right; f, terminal view of same.

7. *Typhlocyba pruni* Edwards, 1888.

1888, *Typhlocyba pruni* Edwards, *Ent. mon. Mag.*, **25**: 158, figs. k and l.
1896; *Typhlocyba pruni* Edwards, Hemipt. Homopt. Brit. Is.: 218.
1928, *Anomia pruni* Edwards, *Ent. mon. Mag.*, **64**: 82.

It is a remarkable fact that not only does this species not

[2] McAtee (1926, *Proc. U.S. National Mus.*, **68**, art. 18: 14, pl. 2, fig. 34) has described a species *T. xanthippe* from New York and also from France (Lille) which appears to be closely allied to if not synonymous with *T. froggatti* Baker. The low magnification of his figure makes it difficult to decide, but although in lateral view the apical appendages of the penis appear to be the same, in the terminal view the anterior appendages appear to be as described by McAtee, simply forked, the inner branch being quite short. No such species has been recorded from France by Ribaut.

occur in France (fide Ribaut) but it is represented from Britain only by the single type specimen.[3] So far as I am aware no other specimens exist in collections. This is in itself suspicious, and one tends to suspect that it is either a pathological species or that it is an aberrant form of a common species. On investigation, I found to my surprise that Edwards' bad figure of the penis is identical with that of *Eupteryx ornata* Leth. as figured by Ribaut. Edwards' figure of the genital style is also identical with Ribaut's figure of that in *Eupteryx aurata* L., the style being the same in both *E. aurata* L. and *E. ornata* Leth. Judging by the genitalia, *T. pruni* Edwards is synonymous with *E. ornata* Leth. The question is, how did Edwards come to place his species in the wrong genus? It seems incredible that all traces of the dark markings of a *Eupteryx* species of the *E. aurata* group should be absent even in an immature (teneral) specimen. Edwards described *T. pruni* as white, corium whitish-hyaline, membrane hyaline with a very faint fuscous tinge. Now this sounds like a teneral specimen, and if we assume that a newly-moulted adult of *T. ornata* is without markings, then it is readily understandable that Edwards would not suspect an entirely pallid species as being a *Eupteryx* and would jump to the conclusion that it was a *Typhlocyba* without examining the tell-tale venation. This seems to be the only explanation. In the absence (lost) of the unique type specimen I propose to synonymise Edwards' species under *Eupteryx ornata* Leth. This species has not hitherto been recorded from Britain, but it has recently been discovered by Mr. Fox Wilson and is listed in this paper under the genus *Eupteryx*.

8. *Typhlocyba opaca* Edwards, 1888.

1888, *Typhlocyba opaca* Edwards, *Ent. mon. Mag.*, **25**: 158, figs. g, h, i.
1896, *Typhlocyba opaca* Edwards, Hemipt. Homopt. Brit. Is.: 218.
1928, *Anomia opaca* Edwards, *Ent. mon. Mag.*, **64**: 83.
1929, *Typhlocyba opaca* China, *Ent. mon. Mag.*, **65**: 230.

The type of this species is missing, although it may exist unlabelled in the Dublin Museum. Only females are present in the British Museum collection, so that I have been unable to investigate the male genitalia. Although Edwards states that *T. opaca* differs from *T. douglasi* in the shape of the genital styles, it seems very doubtful whether this species is really distinct from *T. douglasi* Edwards, which by the way is probably only a pale variety of *T. cruentata* H.S., as pointed out by Wagner (1935, *Verh. Ver. naturw. Heimatforsch. Hamburg.*, **24**: 30-31).

Wagner maintains that *T. cruenta* H.S. is the fully coloured form, *T. gratiosa* Edwards nec Boheman (=*T. inquinata* Ribaut) is an intermediate variety and *T. douglasi* Edwards is the uni-

[3] Vide China, 1929, *Ent. mon. Mag.*, **65**: 230.

formly yellow variety. The genitalia are identical in all three forms. To these we can probably add *T. opaca* Edwards as the extreme pallid form. The synonymy will thus be:—

Typhlocyba cruenta H.S., 1839.

var. *inquinata* Ribaut, 1936 (=*gratiosa* Edwards, 1896, nec Boh., 1851).
var. *douglasi* Edwards, 1878.
var. *opaca* Edwards, 1888.

All forms occur principally on beech, but are sometimes found on other trees such as chestnut, hazel, hornbeam and apple.

9. *Typhlocyba bidentata* Edwards, 1914 (fig. 7a-h).

1914, *Typhlocyba bidentata* Edwards, *Ent. mon. Mag.*, **50**: 170, figs. a, b.
1928, *Anomia bidentata* Edwards, *Ent. mon. Mag.*, **64**: 83.
1935, *Typhlocyba bidentata* Wagner, *Verhandl. Ver. naturw. Heimatforsch. Hamburg*, **24**: 32-33.

This species, which is not recorded from France by Ribaut, was described from a single male taken off hazel at Colesborne, Gloucestershire, on 15th October, 1913. Wagner (1935) records a specimen found in the cell of a wasp, *Crabro ambiguus*, near Bremen in Germany. This specimen had been parasitised by a Dryinid. He was of the opinion that *T. bidentata* Edwards was merely a specimen of some species of *Typhlocyba*, the penis of which had been shrivelled by infestation of the nymph by a Dryinid parasite.

In support of this idea there is in the British Museum collection a male of *T. bidentata* from the type locality, 30.vii.1922, identified by Edwards. This male has the penis stem longer than in the type, with the two apical processes much longer and forming a U something like those in *T. staminata* Rib. but without the lateral filaments. It appears to be in fact a form in which the shrivelling effect of parasitisation is less marked than in the type. The lateral lobes of the pygophor differ in the type specimen from those in the specimen determined later by Edwards, and it would seem that this structure also is affected by parasitisation. Indeed Ribaut (1936, Faune France, **31**, Typhlocybidae: 17-18) states that this is the case. *T. bidentata* is almost certainly a pathological form of either *T. avellanae* Edwards or *T. staminata* Ribaut. Both these species differ not only in the shape of the penis but in the shape of the lateral lobes of the pygophor. In this character *T. bidentata* more nearly resembles *T. avellanae*, especially in the possession of a number instead of only three bristles on the lower half. It would, therefore, be convenient to

remove *T. bidentata* from the Palaearctic list by sinking it as a synonym of *T. avellanae* Edw., of which it may be regarded as a pathological form. I therefore propose the following synonymy:—

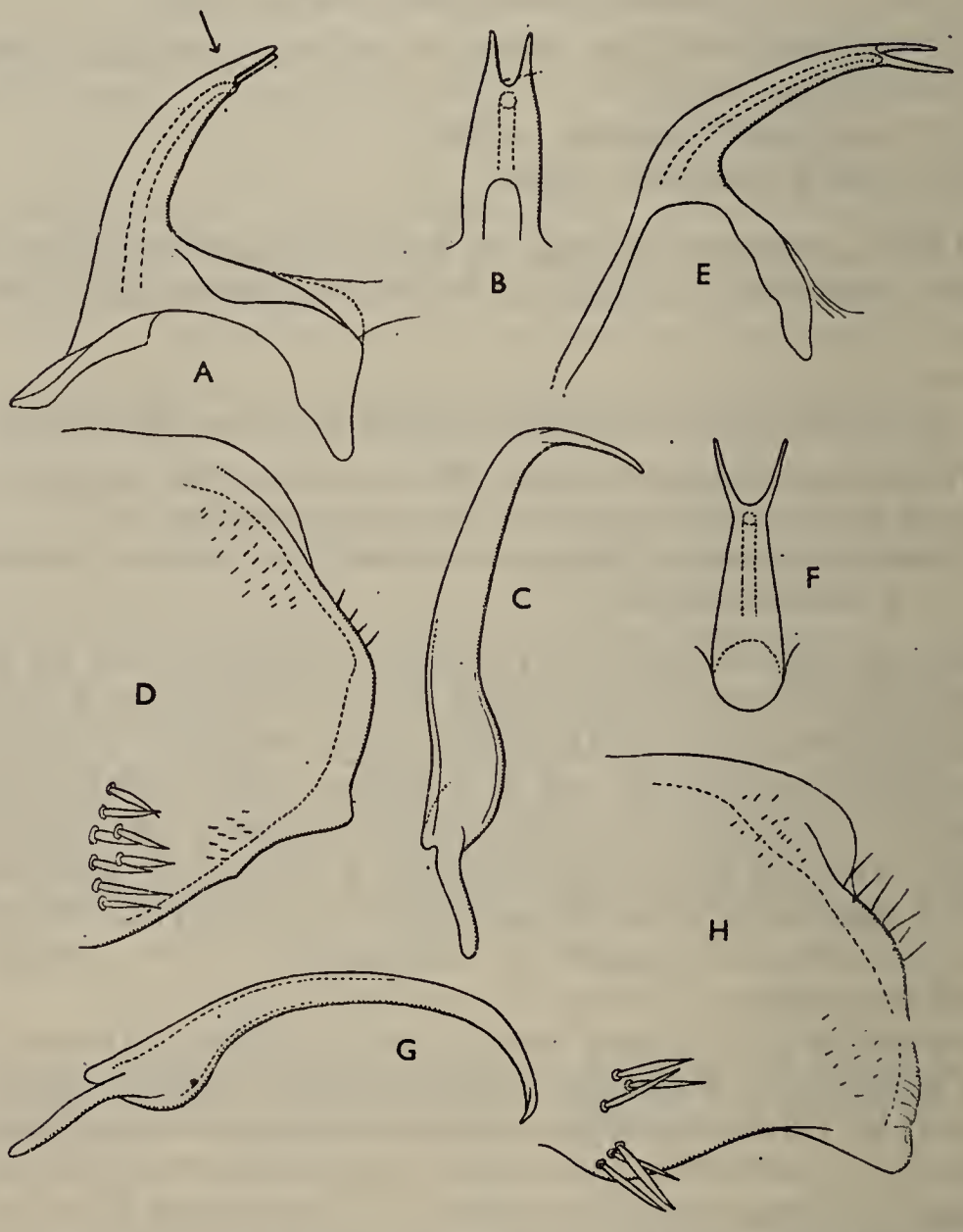

FIG. 7.—*Typhlocyba bidentata* Edwards (=pathological *T. avellanae* Edw.), ♂. a, Lateral view of penis from the right; b, postero-dorsal view of same in direction of arrow in fig. a; c, genital style (paramere); d, pygophor, lateral view from the left; e, lateral view of penis from the right of another less distorted specimen; f, postero-dorsal view of same; g, genital style of same; h, lateral view of pygophor of same from the left.

Typhlocyba avellanae Edwards, 1888.

1888, *Typhlocyba avellanae* Edwards, *Ent. mon. Mag.*, **25**: 157.
1914, *Typhlocyba bidentata* Edwards, op. cit., **50**: 170.

Figures are given of the genitalia of the type (fig. 7 a-d) and of the second male (fig. 7 e-h).

10. *Typhlocyba tridentata* (Edwards, 1928) (fig. 8 a-d).

1928, *Anomia tridentata* Edwards, *Ent. mon. Mag.*, **64**: 80, figs. c, d.
1929, *Typhlocyba tridentata* China, *Ent. mon. Mag.*, **65**: 231.
1935, *Typhlocyba tridentata* Wagner, *Verhl. Ver. naturw. Heimatforschung. Hamburg*, **24**: 32-33.

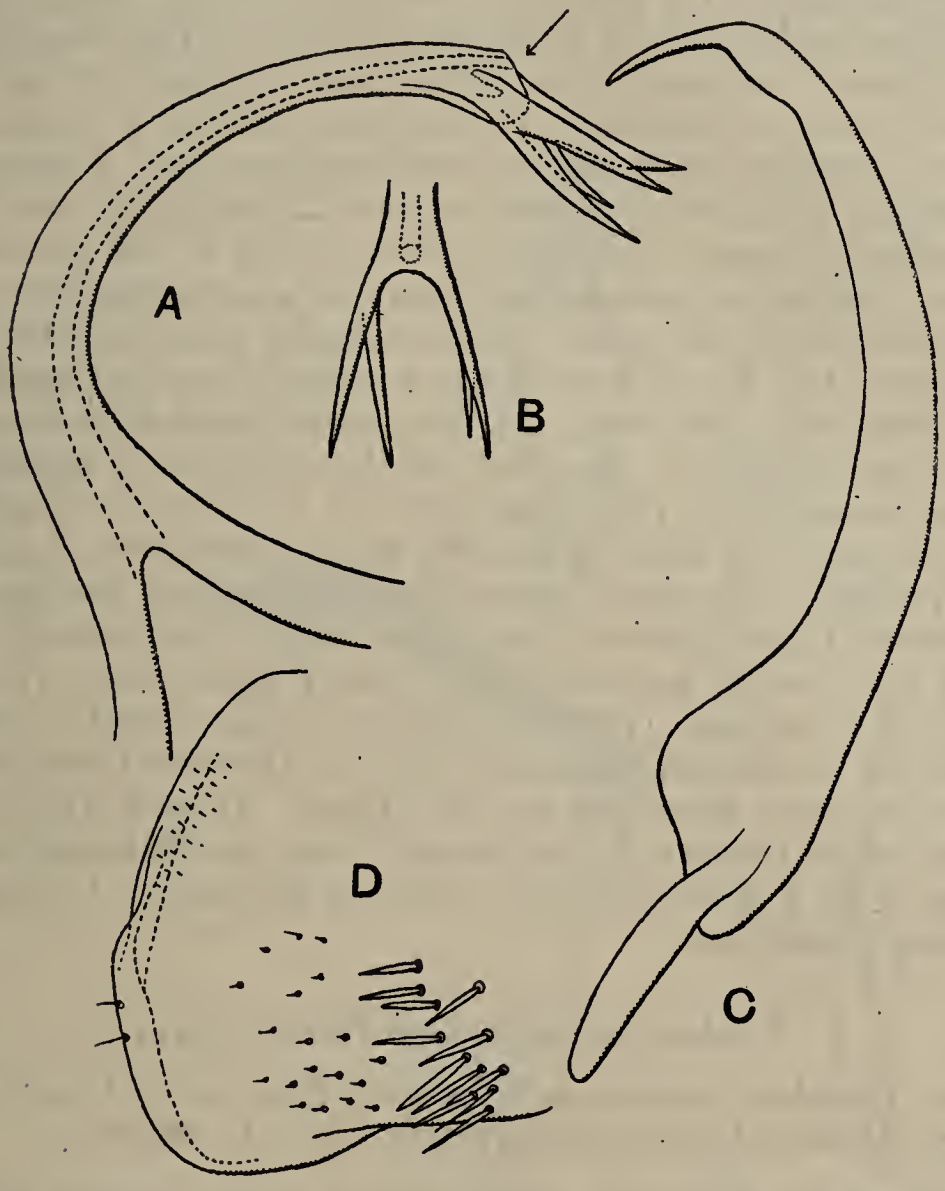

Fig. 8.—*Typhlocyba tridentata* Edwards (=pathological *T. diversa* Edw.), ♂. a, Lateral view of penis from the right; b, postero-dorsal view of apical appendages of penis; c, genital style (paramere); d, lateral view of pygophor from the right.

This species was described by Edwards from a single male taken on dogwood at Colesborne, Gloucestershire, 12.vii.1922. Wagner (1935) records two specimens with similar genitalia found in a cell of the wasp *Crabro ambiguus* near Bremen in Germany. These specimens had been parasitised by Dryinids, and Wagner expressed the opinion that *T. tridentata* Edwards was merely a pathological specimen with the penis distorted and shrivelled by the effects of parasitisation. Ribaut (1936) in his monograph of the French Typhlocybidae states: 'The systematist must always be prepared for the possible presence of various

parasites, because they can in certain cases profoundly alter the essential characters of the species. The form of the styles, penis, pygophor and the abdominal apodemes, and even of the characteristic pigmentation of the male when such exists, can be altered in varying degrees.'

An examination of Edwards' dry dissection of the genitalia of the unique male type of *T. tridentata* shows that the tip of the penis appears to have three spine-like processes as figured by Edwards, but on boiling in potash and making a proper microscopical preparation it was at once obvious that Edwards (and presumably Wagner) had been misled in his figure and description by the asymmetrical structure of the tip of the penis. There are four, not three, pointed appendages, directed in line with the axis of the end of the penis. These actually consist of two appendages forked on the underside, but whereas the right hand appendage forks near the base, the left hand appendage forks much nearer the extremity. The fork of the right hand appendage is directed inwards, so that from above it is visible for a good deal of its length. The fork of the left hand appendage, on the contrary, lies below the main appendage, thus giving the appearance of forming three spines. This structure is undoubtedly pathological and due to parasitisation, and I agree with Wagner in regarding it as such. The only species so far found on dogwood (*Cornus*) is *T. diversa* Edwards. Mr. P. Harwood has found this species in some numbers on that plant. It will, therefore, be convenient to remove *T. tridentata* from the Palaearctic list by sinking it as a synonym of *T. diversa* Edwards. I propose the following synonymy:—

Typhlocyba diversa Edwards, 1914.

1914, *Typhlocyba diversa* Edwards, *Ent. mon. Mag.*, **50**: 171.
1928, *Anomia tridentata* Edwards, op. cit., **64**: 80.

Figures are given of the genitalia of the unique type male (fig. 8a-d), as Edwards' figures are, as previously stated, quite inaccurate.

11. *Typhlocyba carri* Edwards, 1914 (fig. 9a-d).

1914, *Typhlocyba carri* Edwards, *Ent. mon. Mag.*, **50**: 170, figs.
1928, *Anomia carri* Edwards, op. cit., **64**: 83.
1935, *Typhlocyba carri* Wagner, *Verhandl. Ver. naturw. Heimatforschung. Hamburg*, **24**: 31.
1935, *Typhlocyba carri* Ossiannilsson, *Ent. Tidskr.*, **1935**: 133, figs. 15, 16.

This species is not recorded by Ribaut from France, although it has been recorded by Wagner from Germany and by Ossiannilsson from Sweden on oak and lime. Judging by the simple aedeagus, it is closely related to the *T. cruenta* H.S. (=*T. opaca*

Edwards) group previously dealt with. The genital styles, however, are very different and characteristic in shape, while each lateral lobe of the pygophor bears a long curved spine-like apophysis on the dorsal side. Altogether this is a very distinctive species as regards genitalia. The upper side is canary-yellow, the colour very intense along the veins of the corium; the membrane is very slightly infumate. Edwards records it from Edwin-

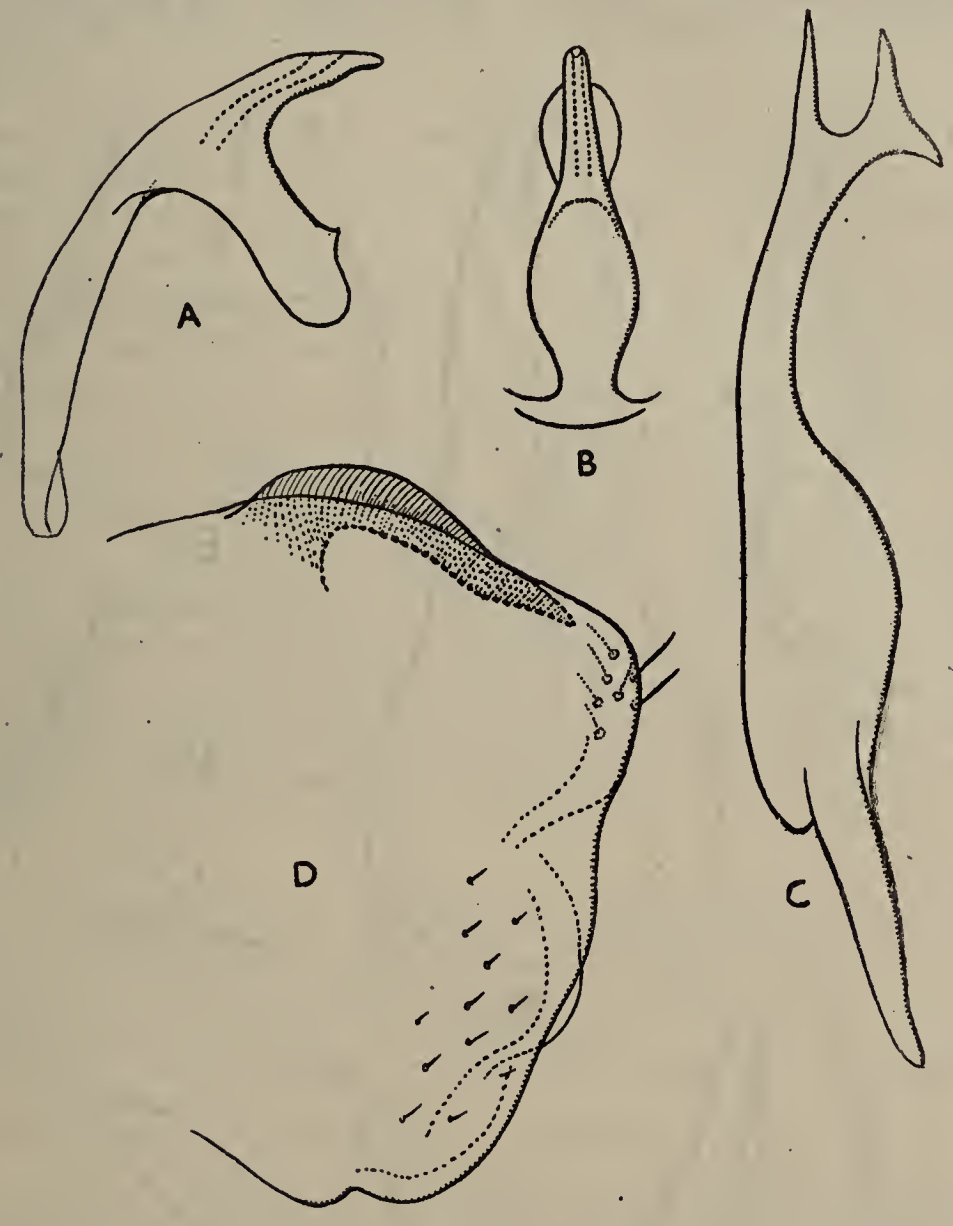

FIG. 9.—*Typhlocyba carri* Edwards, ♂. a, Lateral view of penis from the right; b, postero-dorsal view of same; c, genital style (paramere); d, lateral view of pygophor from the left showing spine-like dorsal apophysis.

stone, Sherwood Forest, Nottinghamshire, 30.viii.1912 (Prof. Carr), and from Arnold, Nottinghamshire, 13.viii.1913, on oak (Prof. Carr). There are also specimens in the British Museum collection from Colesborne, Gloucestershire, 20.ix.1907, taken on oak by James Edwards.

The genitalia, which are herewith figured, strongly resemble in some respects those found in certain species of *Erythroneura*, especially in the simple aedeagus and in the long robust anal

spine or dorsal apophysis of each lateral lobe of the pygophor. In this last respect *T. carri* forms a connecting link between *Erythroneura* and the *T. cruenta* group of *Typhlocyba*.

12. *Typhlocyba complicata* (Edwards, 1928) (fig. 10a-e).

1928, *Anomia complicata* Edwards, *Ent. mon. Mag.*, **64**: 80, figs. a, b.
1929, *Typhlocyba complicata* China, *Ent. mon. Mag.*, **65**: 248.

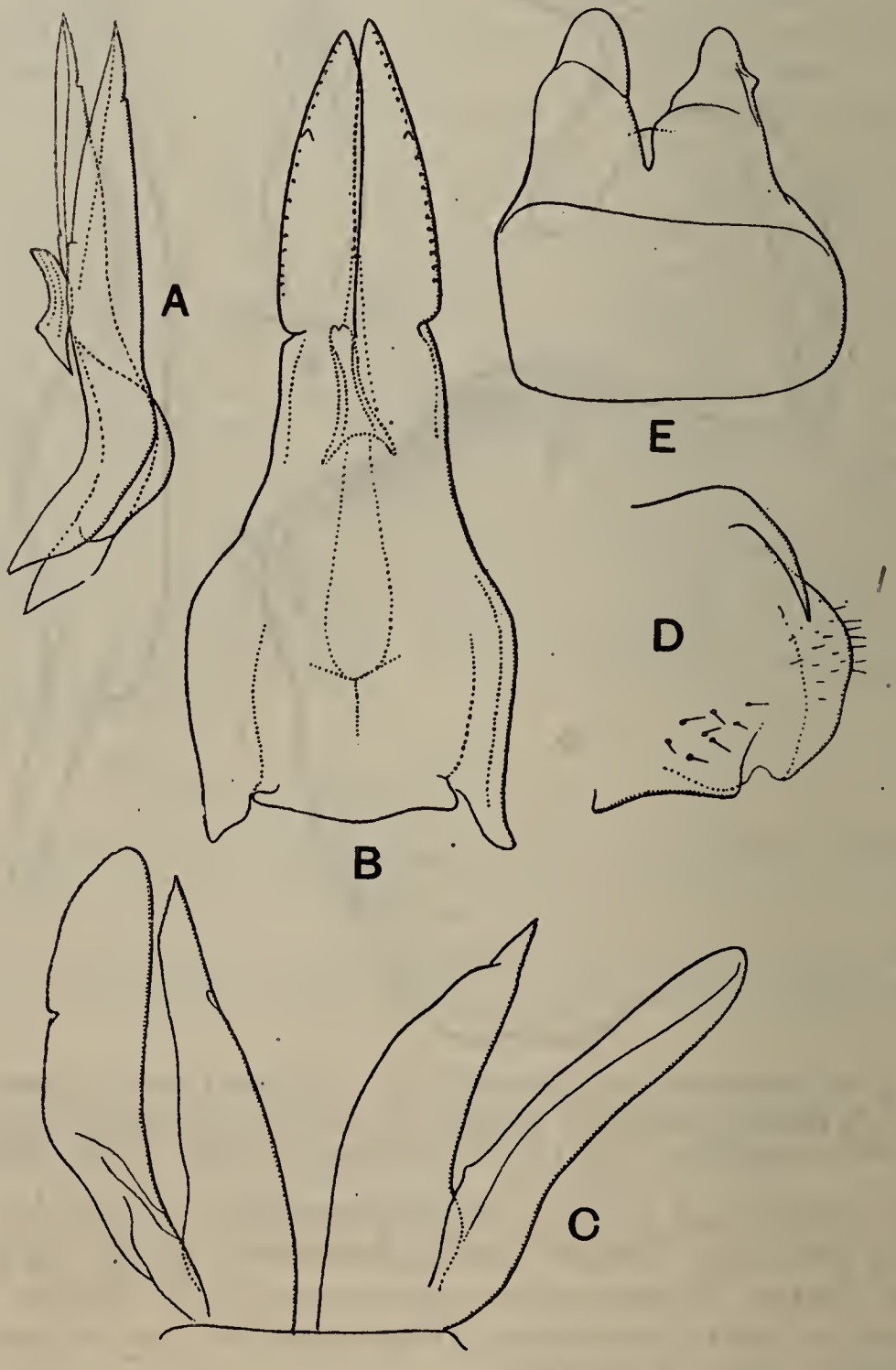

Fig. 10.—*Typhlocyba complicata* Edwards, ♂. a, Lateral view of penis from the left; b, posterior view of penis; c, ventral view of subgenital plates and genital styles which are attached to posterior margin of pygophor (ninth segment); d, lateral view of lobe of pygophor from the left; e, ventral view of eighth abdominal sternite showing bilobed process directed posteriorly.

This species, which was described by Edwards from a single male collected on horse chestnut at Colesborne, Gloucestershire, 10.viii.1922, is not recorded by Ribaut from France nor by Wagner or Ossiannilsson from Germany or Sweden. Edwards states that in the minute aedeagus with large attendant plates it resembles *T. nitidula* F., i.e. *T. bifasciata* Boh. On boiling the tip of the abdomen of the type specimen in potash and making a proper microscopical preparation, it was at once obvious that this specimen is a pathological one. The genital styles, instead of being articulated to the basal plates of the aedeagus, arise from the ventral edge of the pygophor in the same way as the subgenital plates. In fact there appear to be two pairs of subgenital plates and no genital styles. The aedeagus resembles that of *T. bifasciata* Boh., but the canaliferous region is much closer to the attendant plates, and in this respect the aedeagus much more resembles that of *T. cruciata* Ribaut with the canaliferous region aborted. The distinct dorsal curved spine-like apophysis of each lateral lobe of the pygophor in *T. complicata* rules out either of these species as the possible normal form, since neither possesses such apophyses. In addition, *T. complicata* possesses another abnormal character in the bilobed process on the ventral margin of the eighth segment. I am unable to correlate this undoubtedly pathological specimen with any known species of Typhlocybidae, and for this reason have been forced to retain the specific name. It is possible that this may be a hermaphrodite specimen. The genitalia are figured for the information of future workers.

13. *Typhlocyba tersa* Edwards, 1914 (fig. 11 a-d).

1914, *Typhlocyba tersa* Edwards, *Ent. mon. Mag.*, **50**: 169-170, figs.
1928, *Anomia tersa* Edwards, op. cit., **64**: 82.
1929, *Typhlocyba tersa* China, op. cit., **65**: 249.
1935, *Typhlocyba tersa* Wagner, *Verhandl. Ver. naturw. Heimatforschung Hamburg*, **24**: 32.
1935, *Typhlocyba tersa* Ossiannilsson, *Ent. Tidskr.*, **1935**: 134, fig. 12.

This species was described from numerous specimens collected by Mr. Oscar Whittaker on willows at Birkdale, Lancashire, in 1911, and has since been noted from Derby and Norfolk. It is not recorded by Ribaut from France, although Wagner reports it from *Salix* in N.W. Germany and Ossiannilsson from Sweden also on willow. It is remarkable that Ribaut should not have discovered this species, and one would suspect that he had regarded it as a mere form of some other closely allied species. It is certainly closely allied to his *T. barbata,* which is also recorded from willows and differs chiefly in the more divergent lateral (superior of Edwards) appendages. *T. barbata* Rib., as has been pointed out previously, has been recorded from England by Wagner, although this record may actually refer either to *T. prunicola* Edw.

or to *T. tersa* Edw. It is also closely allied to Ribaut's *divergens* (i.e. *T. plebeja* Edwards) and differs principally in the greater length of the appendages of the penis and in the straight, non-curved lateral appendages of the same. The lateral lobe of the pygophor, however, is distinct. All the three species, *T. prunicola, T. plebeja* and *T. tersa,* described and figured by Edwards together in 1914 are very closely allied and may eventually prove to be, with *T. barbata* Rib. and *T. divergens* Rib., forms of the same species. The genitalia of the type male of *T. tersa* Edw. are figured.

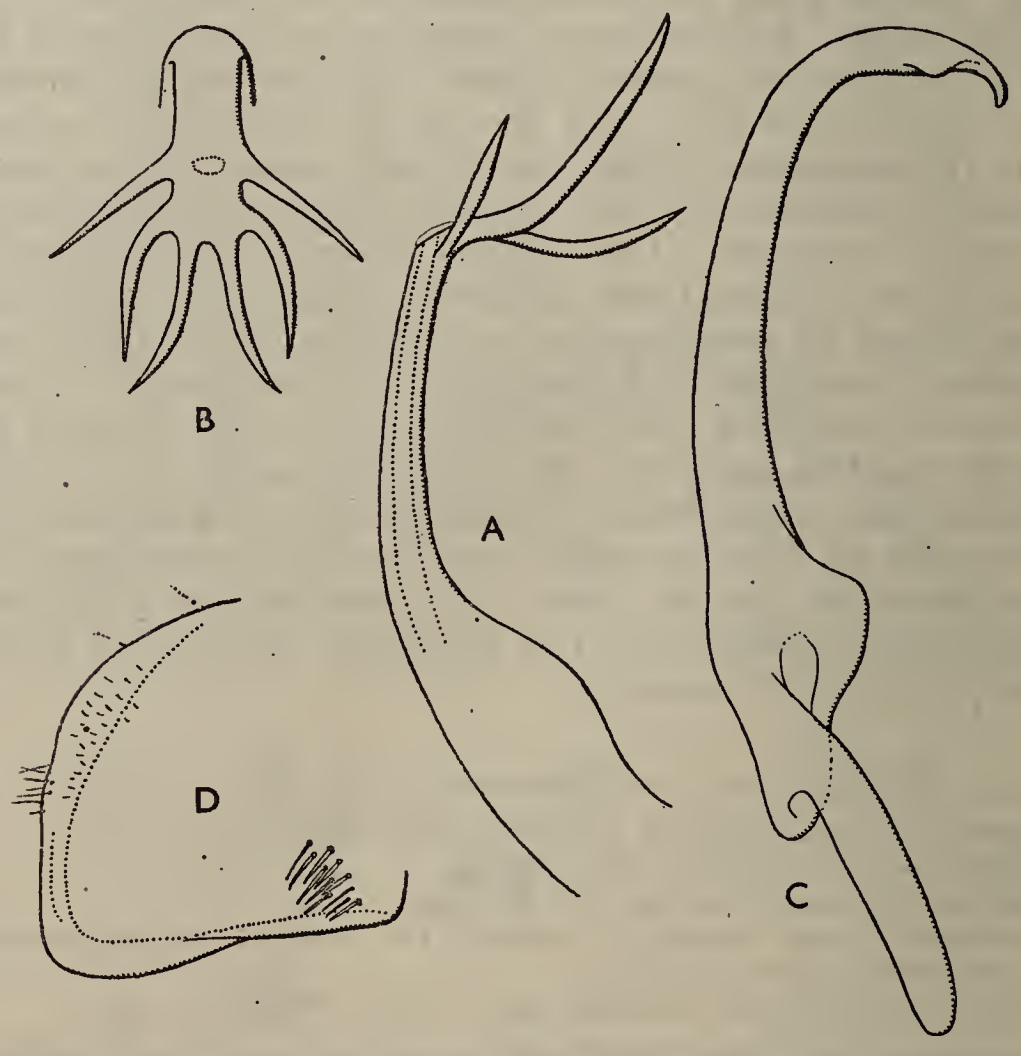

Fig. 11.—*Typhlocyba tersa* Edwards, ♂. a, Lateral view of penis from the right; b, terminal view of apical appendages of the penis; c, genital style (paramere); d, lateral view of lobe of pygophor from the right.

14. *Typhlocyba alnicola* Edwards, 1924 (fig. 12 a-d).

1924, *Typhlocyba alnicola* Edwards, *Ent. mon. Mag.*, **60**: 54, figs. 4-5.
1928, *Anomia alnicola* Edwards, *Ent. mon. Mag.*, **64**: 82.
1935, *Typhlocyba alnicola* Ossiannilsson, *Ent. Tidskr.*, **1935**: 133, fig. 8.
1935, *Typhlocyba alnicola* Wagner, *Verhandl. Ver. naturw. Heimatforschung Hamburg*, **24**: 31.

This species was described from specimens collected on alder at Colesborne, Gloucestershire, in July, 1922. It is a very distinct species as regards male genitalia and appears to be allied

to *T. salicicola* Edwards. Although, strangely enough, it is not recorded from France by Ribaut, it is listed by Ossiannilsson from Sweden and by Wagner from Germany.

In pursuance of the policy adopted here of figuring the genitalia of all British species not dealt with by Ribaut, figures are given of the type male.

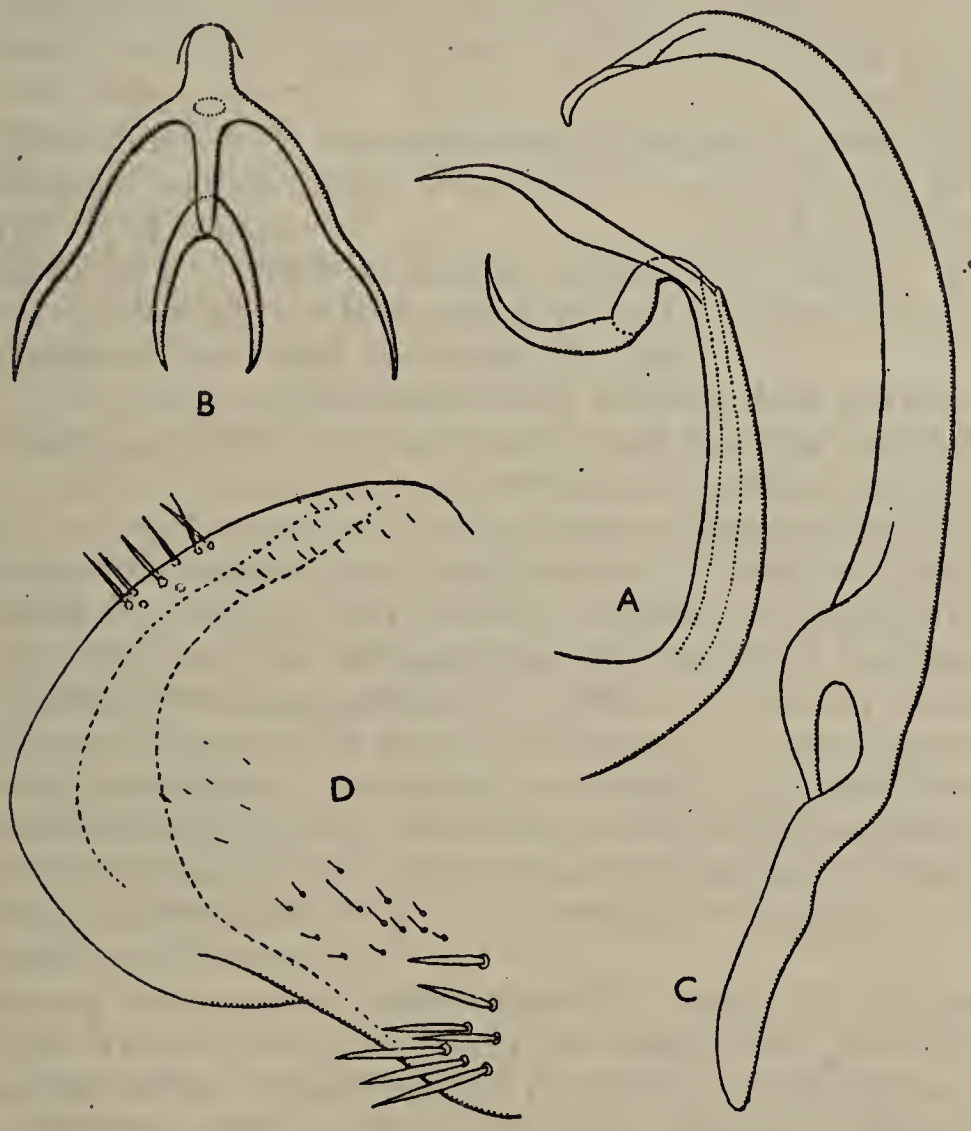

FIG. 12.—*Typhlocyba alnicola* Edwards, ♂. a, Lateral view of penis from the left; b, terminal view of apical appendages of penis; c, genital style (paramere); d, lateral view of lobe of pygophor from the right.

KEY TO BRITISH SPECIES OF *TYPHLOCYBA* GERMAR.

In 1928 (ref. supra) Edwards published a key to the British species of *Typhlocyba* (=*Anomia* Edw.), of which he listed thirty-seven species. Of these species seven must now be removed, two (*tridentata* and *bidentata*) as pathological forms of existing species, four (*gratiosa, distincta, douglasi* and *opaca*) as ordinary synonyms of existing species and one (*pruni*) as a synonym of a species of *Eupteryx*. This would leave us with thirty species, but since that time and including the present paper, seven additional

species have been added to or reinstated in the British list, so that the total number of species is still thirty-seven, including, however, one undoubtedly pathological form (*T. complicata* Edw.) of doubtful specific identity, which is excluded from the following key. The genitalia of all the British species are figured either in Ribaut's monograph, 1936, or in this paper.

1. Clavus and inner half of corium (excluding extreme base) of a uniformly deep brownish-red or brownish-black colour .. 2.
— Clavus and inner half of corium not of a uniformly deep colour ..... 3.
2. Deep colour of tegmina brownish-red. Pronotum and crown for the most part of the same colour as the tegmina. On beech and elm ..... 1. *T. cruenta* H.S. (typical).
— Deep colour of tegmina brownish-black. Pronotum and crown whitish. On wych elm and hornbeam
6A. *T. bifasciata* Boh. var. *norgueti* Leth.
3. Pronotum with at least three black spots ..... 4.
— Pronotum without black spots, or with only one small black spot in middle of anterior margin ..... 6.
4. Amongst the black spots on the pronotum there is a median unpaired spot of an elongate oval shape. On alder, less commonly on willow, elm and oak ... 2. *T. jucunda* H.S.
— Pronotum without such an unpaired median spot ..... 5.
5. Lateral margins of face (i.e. postclypeus and anteclypeus[4]) deep brown. The ground colour of tegmina nearly always reddish. Six spots on pronotum, sometimes the three spots on each side fused into an irregular band. Brownish parts of corium, at least in male, not divided into two transverse bands. On birch ..... 3. *T. decempunctata* Fallen (=*betulicola* Edws.).
— Face entirely pale. Ground colour of tegmina greenish or whitish, four spots on pronotum, the pair on each side sometimes united by an oblique band. Brownish parts of corium divided into two widely separated transverse bands. On willows ..... 4. *T. sexpunctata* Fallen (=*sexmaculata* Hardy).
6. Clavus with several isolated brick-red or yellowish-orange spots, of which one oval or quadrangular spot, situated half-way between the base and apex of clavus, occupies almost the entire width. Lives on oak and plum, rarely on cherry, birch and sallow ..... 5. *T. quercus* F.
— Clavus without red or orange spots but sometimes with a longitudinal red stripe down the interior margin ..... 7.
7. Tegmina with two broad brownish-black transverse bands. On wych elm and hornbeam ..... 6. *T. bifasciata* Boh. (=*nitidula* Edws.).

[4] Formerly termed frons and clypeus respectively.

— Tegmina without such bands ..... 8.
8. A broad brownish-black stripe running the whole length of the claval suture, which lies in the middle of the stripe. On alder ..... 7. *T. geometrica* Schrk. (=*plagiata* Hardy).
— No such stripe down the claval suture ..... 9.
9. Clavus entirely or in part tinted brownish-black ..... 10.
— Clavus entirely pale, either white, pale yellow or golden-yellow, with no trace of brownish markings ..... 13.
10. Female more than 4 mm. long. Penis divided almost from the base into two simple, strongly-arched branches, curved towards one another to form in posterior view nearly a complete circle. On alder, hawthorn and sycamore ..... 8. *T. callosa* Then.
— Female less than 4 mm. long. Penis not as above ..... 11.
11. Clavus entirely infuscate; discal cells, especially the radial cell, longly infuscate at their apices. Penis very much reduced, claw-shaped; a long spiniform apophysis at dorsal margin of each lateral lobe of pygophor. On beech; occasionally on nut and apple .. 1A. *T. cruenta* H.S. var. *inquinata* Boh. (=*gratiosa* Edws. nec. Boh.).
— Clavus infuscate only along the inner margin (sometimes only very narrowly); discal cells shortly infuscate at their apices, the radial cell usually more shortly (often not at all) infuscate; no spiniform apophysis at dorsal margin of each lateral lobe of pygophor ..... 12.
12. Lateral appendages (superior of Edwards) thickest at base, much shorter than the two outer anterior appendages (inferior of Edwards), viewed anteriorly, forming a crescent with the points directed upwards (fig. 6f). On hawthorn, plum and apple ..... 9. *T. froggatti* Baker (=*oxyacanthae* Rib.=*australis* Froggatt).
— Lateral appendages slender at base, dilated in middle, much longer than the two outer anterior appendages; viewed anteriorly forming a broad arc with the points directed downwards (fig. 6b). On hawthorn ... 10. *T. crataegi* Dgl.
13. Apices of apical nervures of tegmina (at least the inner and outer nervures) and the apex of the transverse subcostal nervure covered by a short brownish-black line or elongated spot ..... 14.
— These brownish-black lines or spots entirely absent ..... 20.
14. Apex of scutellum with a small black spot readily visible from above ..... 15.
— Apex of scutellum without such a spot ..... 16.
15. Total length more than 3.5 mm. Apex of penis with a very short notched process, which is sometimes absent. On elm; less commonly on alder, lime and other trees and bushes ..... 11. *T. ulmi* L. (=*ocellata* Curtis).

— Total length less than 3·5 mm. Apex of penis with two long forked branches. Abundant on apple, pear, plum, quince, rose, bramble, oak and alder; less common on nut, birch, lime and elm .. .. 12. *T. debilis* Dgl.

16. Posterior tibiae with brown spots at the bases of the spines of the external superior row. On oak
13. *T. scalaris* Ribaut.

— Posterior tibiae without such brown spots, rarely present in some specimens of *T. tenerrima* H.S. ..... 17.

17. Total length more than 3·5 mm. Basal appendages of the penis much shorter than the canaliferous main stem
11. *T. ulmi* L. (=*ocellata* Curtis).

— Total length less than 3·5 mm. Basal appendages of penis as long as or longer than the canaliferous part ..... 18.

18. Apical region of tegmen very unequally infuscate, the dark smoky region forming a triangular pattern, the posterior angle of which extends to the middle of the second apical cell. Black spot at the apex of the internal apical nervure relatively large. Yellow pigmentation of the tegmen largely interrupted along the claval suture. Head narrow and pointed. Canaliferous central portion of penis with a forked appendage on the basal third of its posterior margin. On oak and many other trees and bushes
14. *T. tenerrima* H.S. (=*rubi* Hardy).

— Apical region of tegmen almost uniformly infuscate; if a dark smoky region exists it does not form a triangle with its posterior angle extending on to the middle of the second apical cell. Black spot at the apex of the internal apical nervure relatively small. Yellow pigmentation of the tegmen not interrupted along the claval suture. Head large and obtuse. Canaliferous central portion of penis without a forked appendage on its posterior margin ... 19.

19. Canaliferous part of penis much shorter than the basal appendages, bearing on each side, a little before the apex, a small spur, projecting at right angles. Smoky tint of tegmen fairly intense, especially at the apices of the discal cells. Crown always without black spots in both sexes. On elm, less common on alder and bramble; occasionally on plum ..... 15. *T. cruciata* Ribaut
(=*tenerrima* McAtee, 1926, nec H.S.).

— Canaliferous part of penis as long as the basal appendages, bearing on each side of its extremity a long easily-broken process with at least three branches. Smoky tint of tegmen slight and brown dashes at ends of apical nervures faintly marked. Two black spots on the vertex in the female (and also in parasitised males). Abundant on apple, pear, plum, quince, rose, bramble, oak and alder, less

common on nut, birch, lime and elm ... 12. *T. debilis* Dgl.

20. Abdomen above for the most part black (except in teneral specimens); apical and transverse nervures of tegmen appearing thickened owing to the regular yellow bordering showing up distinctly against the strongly infuscate background ..... 21.

— Abdomen above entirely pale. Apical and transverse nervures of tegmen very fine, hair-like, not distinctly bordered with pale colour in those species with the apical region of tegmen infuscate ..... 22.

21. Canaliferous part of penis smooth, of regular thickness, its apical appendages parallel with its axis. Lives on oak and bramble ..... 16. *T. aurovittata* Dgl.

— Canaliferous part of penis bearing spiniform tubercles; more or less inflated in the apical half; its apical appendages forming a right angle with its axis. On oak and less commonly on brambles and maple
17. *T. pandellei* Leth. var. *spoliata* Horv.

22. More than 4.3 mm. Penis in shape of pair of callipers
8A. *T. callosa* Then. var. *distincta* Edw.

— Less than 4.3 mm. Penis otherwise ..... 23.

23. Lobes of male pygophor furnished with a spiniform appendage lying along the dorsal edge and directed towards the rear;[5] penis very short, in the form a claw, without appendages of any kind ..... 24.

— Lobes of male pygophor without such spiniform appendages; penis either in form of a stalk branched at its end, or very short but not in the form of a claw ..... 26.

24. Genital style foot-shaped at apex, with a short pointed heel and a long pointed toe ..... 25.

— Genital style U-shaped at apex with a short tooth projecting from one side of base of the U. On oak ... 18. *T. carri* Edw.

25. Tegmina in male bright yellow. Lives on beech
1B. *T. cruenta* H.S. var. *douglasi* Edw.

— Tegmina in male whitish, powdery. On horse-chestnut
1C. *T. cruenta* H.S. var. *opaca* Edw.

26. Penis very short, divided at base into two simple branches, curved towards one another, the whole, seen in posterior view, forming almost a complete circle
..... 8A. *T. callosa* Then. var. *distincta* Edw.

— Penis developed into a long stalk bearing two to ten appendages at its apex ..... 27.

27. An odd number of apical appendages of penis (five) ..... 28.

— An even number of apical appendages of the penis (two to ten) ..... 29.

[5] *T. complicata* Edwards would run down here, but differs from Section 23 in the pair of long plate-like appendages attached to the small simple penis.

28. All the appendages protruding from the apex of penis, the odd (median) one directed at right angles to the axis. On hawthorn, plum and apple ..... revert to 12.
— Two appendages protruding from the anterior margin of penis at a point some distance from its apex; the odd one directed from the apex of the penis in line with its axis. On hazel ..... 19. *T. spinigera* Edw.
29. Two appendages at the end of penis. On hazel ..... 20. *T. avellanae* Edw. (=*T. bidentata* Edw. pathological).
— Four appendages (sometimes apparently three in pathological specimens) ..... 30.
— Six appendages ..... 34.
— Eight to ten appendages ..... 42.
30. Anterior (inferior of Edwards) appendages of penis with a common, median stem, the branches in side view strongly curved upwards and claw-like; in terminal view forming a Y; lateral (superior of Edwards) appendages slender and sinuate. On alder ..... 21. *T. alnicola* Edw.
— Anterior (inferior) appendages both arising from apex of penis, no common stalk, in terminal view not forming a Y ..... 31.
31. Anterior (inferior) appendages of penis forming an ogive (pointed arch), the lateral appendages thread-like. On hazel ..... 22. *T. staminata* Rib. (=*avellanae* var. Edw.).
— Anterior (inferior) appendages forming a V[6] ..... 32.
32. Stem of penis with its anterior margin dilated and compressed laterally. Lateral appendages flattened, lanceolate, projecting almost at right angles to the axis of the stem. Anterior appendages in side view for a large part hidden by the lateral appendages. On rose, apple, alder and various other bushes and trees ..... 23. *T. roseae* L. (=*T. lactea* Dgl.).
— Stem of penis possibly slightly compressed but not dilated and laminate along its anterior margin. Lateral (superior) appendages linear, not flattened, projecting more or less in line with the axis of the stem. Anterior (inferior) appendages in side view entirely visible ..... 33.
33. Stem of penis compressed or flattened laterally; anterior (inferior) appendages recurrent (curving back) along axis of stem for nearly half its length; lateral (superior) appendages very divergent at base; posterior-ventral angle of lobe of pygophor entirely pallid. On willow and sallow ..... 24. *T. salicicola* Edw.
— Stem of penis compressed from front to back; the anterior (inferior) appendages not recurrent; lateral (superior)

[6] *T. tridentata* Edwards, which is a pathological form of *T. diversa* Edw., runs down to here, but the four appendages are asymmetrical, short and acicular.

appendages almost parallel with one another at base; posterior-ventral angle of lobe of pygophor with a black tubercle. On sycamore ..... 25. *T. nigriloba* Edw.

34. Two appendages of penis arising from anterior margin of penis at a point some distance below its apex. On hazel ..... 19. *T. spinigera* Edw.

— All the appendages of penis arising from the end of penis .. 35.

35. Lateral (superior) appendages of penis directed towards the front, in side view more or less at right angles to the axis of the stem ..... 36.

— Lateral (superior) appendages erect, directed more or less in line with the axis of the stem ..... 39.

36. Branches of each anterior (inferior) appendage of penis with their apices converging so that in side view they are shaped like a lobster's pincer. On elm, beech, cultivated plum, Spanish chestnut and hazel ..... 26. *T. frustrator* Edw. (=*T. solearis* Ribaut).

— Branches of each anterior (inferior) appendage with their apices divergent, seen in side view ..... 37.

37. Branches of each anterior (inferior) appendage of penis strongly flattened, the inner branch distinctly shorter than the outer as seen in terminal view. On dogwood, oak, poplar, etc. ..... 27. *T. diversa* Edw. (=*T. tridentata* Edw., pathological).

— Branches of each anterior (inferior) appendage not flattened, the inner branch at least as long as the outer as seen in terminal view ..... 38.

38. Anterior (inferior) appendages of penis forking beyond the middle so that the common stem of each appendage is as long as or longer than the resulting branches. On alder ..... 28. *T. lanternae* Wagner.

— Anterior (inferior) appendages forking at base so that there is scarcely any common stem of the resulting branches. On cultivated plum . 29. *T. prunicola* Edw. (=*T. barbata* Rib., a non-British subspecies on willows).

39. Lateral (superior) appendage of penis much shorter than longest branch of anterior (inferior) appendage, especially in side view ..... 40.

— Lateral (superior) appendage as long as or longer than the branches of the anterior (inferior) appendages ..... 41.

40. Appendages of penis robust; the branches of the anterior (inferior) appendage seen in side view widely separated at point of forking, the inner branch immediately curved upwards and outwards so that it lies well above the outer branch seen from the side. On elm, less commonly on oak, lime, alder, hazel, horse-chestnut ..... 30. *T. plebeja* Edw. (=*T. divergens* Rib.).

— Appendages of the penis slender ; the branches of the anterior (inferior) appendage seen in side view forming an acute angle at the point of forking, the inner branch not at all curved upwards but lying for the greater part of its length below the outer branch as seen in side view. On willows ..... 31. *T. tersa* Edw.

41. Anterior (inferior) appendages of penis in terminal view widely separated, each appendage forked a little beyond the base so that there is a short common stem to the two resulting branches, which run close to one another ; the lateral (superior) appendages much longer than the anterior, seen in posterior view forming a U. On beech and hornbeam ..... 32. *T. fratercula* Edw.

— Anterior (inferior) appendages, in terminal view, not widely separated, the inner branches closer to one another than to their respective outer branches, each appendage forked at base so that there is no common stem to the two branches of each appendage, which are widely separated from one another ; the lateral (superior) appendages not or little longer than the anterior ones, seen in posterior view forming a V. On poplars and willow, sometimes on alder ..... 33. *T. candidula* Kbm.

42. Anterior (inferior) appendages, seen in terminal view, forking some distance from their base, so that the two resulting branches have a common stem as long as the branches. On alder ..... 34. *T. bergmani* Tullgren (= ?*T. ariadne* McAtee, 1926).

— Anterior (inferior) appendages seen in terminal view forking at base before the complete separation of the two appendages, so that their inner branches have a common stem ..... 43.

43. Inner and outer branches of anterior (inferior) appendage of penis, seen in side view, widely separated with opposing concavities ; the outer branch usually simple, rarely (var. *plurispinosa* Wagner[7]) with a small spur on dorsal margin. On maple, also on horse-chestnut ..... 35. *T. lethierryi* Edw., 1881 (= *T. hippocastani* Edw., 1896 & 1920, not 1888).

— Inner and outer branches of anterior (inferior) appendage of penis, seen in side view, running close together, the convexity of the outer fitting into the concavity of the inner ; the outer branch usually with a small spur of varying length near base. On elm, also on horse-chestnut, horn-

[7] Mr. P. Harwood has taken this variety in the New Forest on alder, 20.x.1940.

beam and hazel ..... 36. *T. hippocastani* Edw., 1888
(=*T. lethierryi* McAtee 1926 nec Edw. 1881).[8]

Note.—*T. pruni* Edw. 1888 is a synonym of *Eupteryx ornata* Leth. 1874, which see.

Genus *Eupteryx* Curtis, 1833 *
(=*Eurhadina* Haupt., 1929).

1. *Eupteryx ornata* (Lethierry, 1874) (fig. 13a-c).

1874, *Typhlocyba ornata* Lethierry, Cat. Hemipt. Dept. Nord. Lille: 71 & 83.
1888, *Typhlocyba pruni* Edwards, *Ent. mon. Mag.*, **25**: 158.
1896, *Typhlocyba pruni* Edwards, Hemipt. Homopt. Brit. Is.: 218.
1928, *Anomia pruni* Edwards, *Ent. mon. Mag.*, **64**: 82.

This species, as described above under *Typhlocyba pruni,* has been wrongly determined generically by Edwards, his type of *T. pruni* being apparently a very teneral and consequently pallid specimen. This species was collected in October, 1940, by Mr. G. Fox Wilson on chrysanthemums at the Royal Horticultural Society's Gardens, Wisley, Surrey, and was at first taken to be *E. aurata* L. (fig. 13d-f), with which it is closely allied and may possibly have been confused. British collectors should re-examine their material of *E. aurata* L. in search of this species. Description after Ribaut:—

Length, ♂ and ♀, 3.70-4.20 mm. Face pale, the male with a triangular black spot below the antennae, the lower angle of which is sometimes extended to the lorae[9]; female with a black band on each side of the fronto-clypeal suture, often joined across the base of the clypeus and covering the lorae. Black spots of vertex as in *E. aurata* L. sometimes fused posteriorly and tending fairly often to approach the eyes, even tending sometimes to send a small branch on to the temple, which it may cover completely. Pronotum with the sides almost parallel; the postocular spots joined to its sides, not convergent posteriorly, without any tendency to spread on to the middle, touching the anterior margin, rounded posteriorly and almost reaching the posterior margin of the pronotum: sometimes truncated and not nearly reaching the posterior margin. Very rarely there are two small black median points near anterior margin of pronotum. Scutellum with two large basal triangular spots extending inwards from lateral margin. Tegmen with a broad longitudinal violet-brown

[8] McAtee's figures (1926, *Proc. U.S. Nat. Mus.*, **68**, art. 18: pl. 2, fig. 37) show that his *T. lethierryi* Edwards is actually *T. hippocastani* Edwards, 1888.

[9] As this paper is mainly intended for British collectors, I have refrained from using the modern terminology of the parts of the head used by Ribaut and have followed that used in Edwards' Monograph.

* Unfortunately the name *Eupteryx* Curtis 1833 must become a synonym of *Cicadella* Dumeril 1806 which has priority (see China, 1939, *Ann. Mag. Nat. Hist.* (11) **4**: 584–586). It is retained in this work only to avoid confusion.

stripe extending from the margin of the scutellum down the whole of the tegmen, usually leaving on the inner half of the clavus, and touching the claval commissure, a yellow spot which is generally narrowed in the middle. The whole of the costal margin of the tegmen is widely free of this stripe, which is angularly bent immediately behind the waxy plaque; the apex of this angle is often marked with a little dark brown spot. Abdomen black.

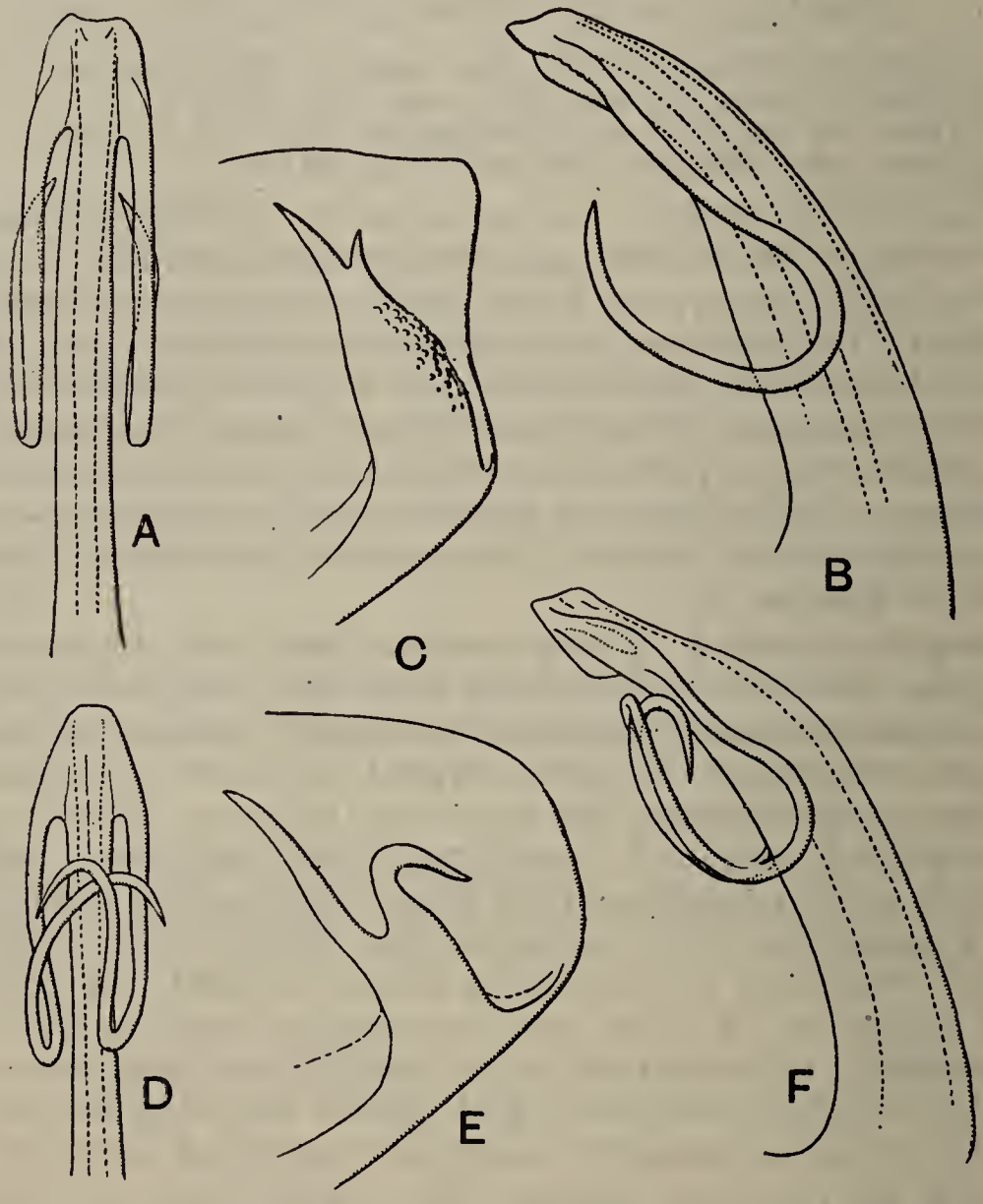

FIG. 13.—*Eupteryx ornata* Lethierry, ♂. a, Posterior view of apex of penis; b, lateral view of apex of penis from the left; c, internal view of right lobe of pygophor.

Eupteryx aurata L. d, Anterior view of apex of penis; e, internal view of right lobe of pygophor; f, lateral view of apex of penis from the left.

♂. Appendage of lobe of pygophor broad at base, granular, divided only on the apical fourth into two conical branches, of which the posterior is shorter than the anterior. Appendages of the penis shorter than in *E. aurata* L., not crossed in front of the stem.

Recorded by Ribaut on the Continent from various species of

Chaerophyllum in damp, shady places, August to September. Edwards' record is from plum and Fox-Wilson's from chrysanthemum.

Genitalia figured with those of *E. aurata* L. (fig. 13d-f) for comparison. Readily distinguished from both *E. aurata* L. and *E. atropunctata* Goeze by the absence of a distinct brownish-black spot just below the waxy plaque of the costal cell. If present, this spot small, not more than half the width of the costal cell.

2. *Eupteryx simplex* Edwards, 1926 (fig. 14a-d).

1926, *Eupteryx simplex* Edwards, *Ent. mon. Mag.*, **62**: 53.

This species was described from a single teneral male collected by James Edwards in a marsh near Horning, Norfolk, on 23rd August, 1925, probably on *Stachys palustris*. It is not recorded by Ribaut from France nor by Wagner or Ossiannilsson from Germany or Sweden. Owing to the immature colouring, a description of the dark brown markings is of little value, but they closely resemble those in *E. urticae*. The median spot on the base of the vertex and the two spots on the face are indicated only by a light infuscation, as are the markings along the margins of the frons and clypeus. There are only four small spots on the pronotum, two towards the anterior margin, two more widely separated towards the posterior margin. There are the two usual triangular spots on the scutellum. The hind tibiae are entirely pale. This species resembles *E. collina* Flor in the absence of an apophysis on the fold of the posterior margin of the lobe of the pygophor, although it possesses a group of eight spicules as in *E. stachydearum* Hardy. It also resembles *E. collina* Flor (fig. 14e) in the shape of the penis, but the two long non-recurved appendages are not so divergent and lack the two small teeth near the bases and the left-hand appendage bears some small teeth. It differs from *E. collina* Flor in having the internal apical nervure of the tegmen arising from the end of the median cell instead of from the radial cell. Because of this character it runs down in Ribaut's key to the *cyclops-urticae* couplet, but the genitalia are quite different. Actually the appendages of the penis are distinctly asymmetrical and suggest that the specimen is pathological. If one could assume that a venational aberration could be caused by parasitisation, then there would be little hesitation in placing *E. simplex* as a pathological specimen of *E. collina* Flor, as may very well be the case in spite of the presence of the above-mentioned spicules on the pygophor and of the teeth on the left-hand appendage of the penis. If no further specimens are collected in the next few years I propose to accept this synonymy, but in the meantime I am retaining *E. simplex* as a distinct species.

The genitalia are figured with those of *E. collina* for comparison.

Edwards (1926, *Ent. mon. Mag.*, **62**: 54) gave a key to the British species of *Eupteryx*. Since then the only changes are the synonymy of *E. britteni* Edwards under *E. cyclops* Mats., and the addition of *E. ornata* Leth. (=*Typhlocyba pruni* Edw.).

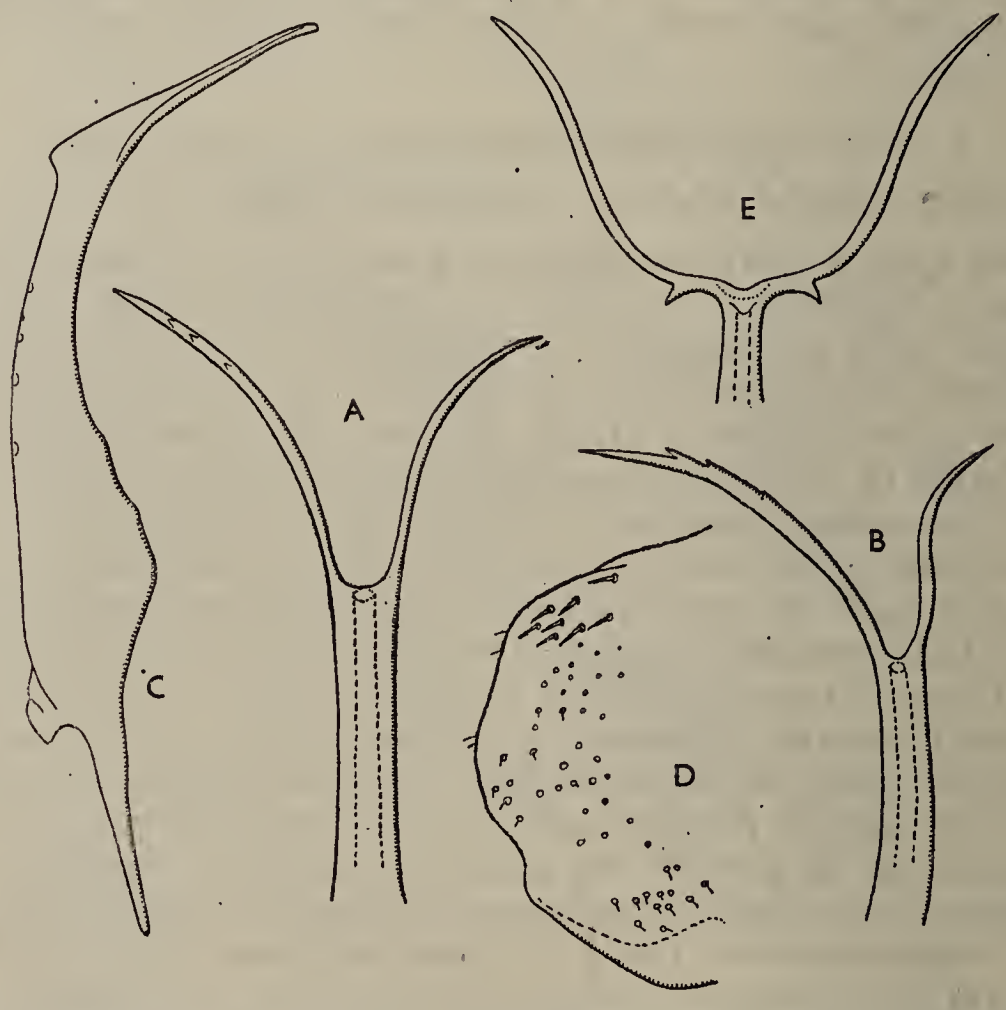

Fig. 14.—*Eupteryx simplex* Edwards. a, Postero-dorsal view of apex of penis; b, three-quarter side view of same; c, genital style (paramere); d, lateral lobe of pygophor from right.

Eupteryx collina Flor. e, Postero-dorsal view of apical appendages of penis.

Genus *Erythroneura* Fitch, 1851

(=*Zygina* Fieber, 1866 = *Idia* Fieber, 1866 = *Zyginidia* Haupt., 1829).

1. *Erythroneura mali* (Edwards, 1915).

1915, *Zygina mali* Edwards, *Ent. mon. Mag.*, **51**: 209, fig. 14.

This species was described from one male and two females collected on apple trees at Colesborne, Gloucestershire, in October, 1913. It is not recorded by Ribaut from France, but Wagner (1939, *Jahrb. Nass. Ver. Naturk.*, **86**: 200) records

females taken by him in fairly large numbers on *Viburnum lantanum* at Binger Wald in Germany on 14th July, 1935. These specimens were identified for him by Ribaut. An examination of the genitalia of the type specimen of *E. mali* Edw. shows that they are identical with those of *E. alneti* Dahlb. as figured by Ribaut, and the specimens on which this species was based were obviously teneral specimens of *E. alneti* Dahlb. Ribaut retains *E. coryli* Tollin as a distinct species, although it differs only in the rather smaller size and less bright tegmina. I propose to regard all three forms as a single species, *E. alneti* Dahlb. The synonymy will therefore be as follows:—

1850, *Cicadula alneti* Dahlbom, *Kongl. Svensk. Vet.-Ak. Handl.*, **1850**: 181.
1851, *Typhlocyba coryli* Tollin, *Stett. Ent. Zeit.*, **1851**: 70.
1915, *Zygina mali* Edwards, *Ent. mon. Mag.*, **51**: 209, fig. 14.
1936, *Erythroneura alneti* Ribaut, Faune France, **31**, Homopt. Auchen. 1, Typhlocybidae: 79, figs. 180-185.

It has been thought unnecessary in this case to figure the genitalia, as Ribaut's figures of *E. alneti* Dahlbom are sufficient.

2. *Erythroneura rhamnicola* (Horvath, 1903).

1884, *Zygina rhamni* Fieber, *Rev. d'Ent.*, **1884**: 159, nec Ferrari 1882.
1903, *Zygina rhamnicola* Horvath, *Ann. Mus. Nat. Hung.*, **1**: 556.
1924, *Zygina concinna* Edwards, *Ent. mon. Mag.*, **60**: 56.
1924, *Zygina rhamni* (Fieber) Edwards, tom. cit.: 56.
1935, *Erythroneura rhamnicola* Hampt, Tierwelt Mitteleuropas, **4**, pt. 3, Ins. 1, Homopt.: 219.
1936, *Erythroneura rhamni* Ribaut, Faun. France, **31**, Homopt. Auchen. 1, Typhlocybidae: 49.

There has been considerable confusion over this species. Apparently *Zygina rhamni* Ferrari, 1882, was wrongly identified by Fieber, followed by Melichar, Edwards and Ribaut, in spite of the fact that Horvath in 1903 drew attention to the misidentification and named Fieber's species *E. rhamnicola*. Ribaut has shown that *Z. concinna* Edwards, 1924, is a variety of *E. rhamni* Rib. (nec Ferrari) known as *suavis* Rey, 1891. Oshanin, 1906, records the true *E. rhamni* Ferrari from Southern France, and it would therefore appear that Ribaut must have recorded it under some other name. Since Horvath, 1898 (*Rev. d'Ent.*, **1898**: 280) has shown that *Zygina simplex* Ferrari, 1882, is synonymous with the true *Zygina rhamni* Ferrari, 1882, it follows that *E. simplex* Ferrari recorded by Ribaut from Southern France is the true *E. rhamni* Ferrari.

Unfortunately, owing to present conditions, I am unable to check the validity of these synonymies, and for the time being propose to accept them without investigation, in spite of the fact

that Ribaut's *E. simplex* is recorded only from willows in summer and brambles in winter. The true *E. rhamni* Ferrari (=*simplex* Ferrari) is a southern species and does not occur in Britain. *E. rhamnicola* Horvath was first recorded as British by Edwards in 1924 under the names *Zygina concinna* Edwards (Essex and Gloucestershire) and *Zygina rhamni* Fieber (Gloucestershire, on *Rhamnus catharticus* and *Rhamnus frangula*).

It has been thought unnecessary in this case to figure the genitalia, as they are identical with those of *E. flammigera* Geoffroy, figured by Ribaut and common to the *flammigera* group of twelve species. These species are all separated on colour characteristics, and I am inclined to regard them all as merely subspecies of *E. flammigera* Geoffroy.

3. *Erythroneura moesta* (Ferrari, 1882).

1882, *Zygina tiliae* Geoffroy, var. *moesta* Ferrari, Cicad. Liguria: 158.
1896, *Zygina umbrata* Melichar, Cicad. Mittel Europa: 358.
1903, *Zygina moesta* Horvath, *Ann. Mus. Nat. Hung.*, **1**: 556.
1906, *Zygina moesta* Oshanin, Verz. Palaark. Hemipt., **2**: 221.
1924, *Zygina umbrata* Edwards, *Ent. mon. Mag.*, **60**: 56.
1936, *Erythroneura angusta* Leth. var. *moesta* Ribaut, Faun. France, **31**, Homopt. Auchen. 1, Typhlocybidae: 46.
1938, *Erythroneura umbrata* China, *Ent. mon. Mag.*, **74**: 197.

In my 1938 paper I listed *E. umbrata* Melichar as one of Edwards' additions to the British list, having inexplicably overlooked the fact that this species was treated by Horvath, Oshanin and Ribaut as synonymous with *E. moesta* Ferrari, regarded by Ribaut as a variety of *E. angusta* Leth., 1874 (= *neglecta* Edw., 1914). In my list No. 664G should therefore be deleted and transferred as var. *moesta* to No. 664A.

Key to the British species of *Erythroneura* Fitch.

1. Vertex with two well-marked black spots ..... 2.
— Vertex without two black spots, or with a single median spot or stripe ..... 4.
2. Clypeus (anteclypeus of Ribaut) not or feebly infuscate, at least on its apical half. Face very elongate. On foxgloves in the field and a common pest of greenhouse plants in Britain ..... *E. pallidifrons* Edwards (=*E. tolosana* Rib.).
— Clypeus (anteclypeus of Ribaut) brownish-black, at least on its apical half. Face relatively broad ..... 3.
3. Appendages of penis widely divergent viewed posteriorly, their common base remote from the base of the canaliferous region of penis seen in lateral view. Female with head and pronotum tinted lemon-yellow; less than 2.70 mm. long. On *Helianthemum* and other low plants ..... *E. parvula* Boh. (=*disjuncta* Rib.).

— Appendages of penis more or less parallel viewed posteriorly, their common base almost contiguous with the base of the canaliferous region seen in lateral view, the appendages lying along its posterior margin. Female with the head and pronotum tinted brick-red or orange; more than 2.70 mm. long. On oak. Ribaut records it from many other trees and also from low plants ..... *E. ribauti* Oss. (=*parvula* Rib. nec Boh.).

4. Vertex with a single large triangular black spot down middle, with sides of spot notched. On *Hypericum perforatum* ..... *E. hyperici* H.S., ♀.

— Vertex without such a black spot ..... 5.

5. Clypeus (anteclypeus) dark brown; dorsum of abdomen dark brown except for a narrow lateral margin. Scutellum with three large black spots, two at base and one at apex. On fine grasses and low plants ..... *E. scutellaris* H.S.

— Clypeus pallid as rest of face; dorsum of abdomen entirely or for the greater part pallid. Scutellum without three black spots so placed ..... 6.

6. Apex of scutellum black almost up to the transverse impression; rest of scutellum yellow. Dorsum of abdomen brown with a broad pallid margin. On *Hypericum perforatum* ..... *E. hyperici* H.S., ♂ (=*Dikraneura pygmaea* Dgl.).

— Apex of scutellum pale or, if not, the whole scutellum dark brown ..... 7.

7. Tegmen with well-marked yellow, orange or red markings 8.

— Tegmen of a uniform whitish, yellowish or greenish tint, without distinct yellow or red markings ..... 13.

8. Clavus infuscate, sometimes very slightly so, especially visible seen from the side; the areas free from red or yellow pigment should be compared with similar areas of the cubital cell to appreciate this infuscation ..... 9.

— Clavus entirely free from infuscation ..... 11.

9. Vertex narrow and prominent, about two-thirds as long as wide at base in female and slightly less in male, basal width not more than 0.3 mm. External region of tegmen not infuscate. Scutellum entirely infuscate, or with only a narrow median longitudinal band pale. Posterior tarsus of male less than half as long as tibia, only the apical segment and the extremity of the second black. On various trees and bushes; in winter on box, ivy, fir and other evergreens ..... *E. angusta* Leth. (=*neglecta* Edwards).

Varieties:

All veins of corium carmine-red .... var. *rubrinervis* Edw.

Red pigment completely absent ..... var. *moesta* Ferrari (=*umbrata* Mel.).

— Vertex broader and less prominent, less than three-fifths as long as wide at base; basal width more than 0.3 mm. External region of tegmen usually infuscate. Scutellum not infuscate or, if so, only at the sides, leaving a broad, pallid median stripe ..... 10.

10. Posterior tarsus of male rather more than half length of tibia, entirely black. On various trees and bushes, in winter on evergreens ..... *E. tiliae* Geoffroy.

— Posterior tarsus of male less than half length of tibia, black only on the apical segment and extremity of preceding one. On willows ..... *E. ordinaria* Ribaut.

11. Scutellum strongly and widely infuscate, usually of a uniform chocolate tint. In less strongly marked specimens the transverse impression and margins of scutellum remain black. A black spot on the mesonotum on each side of apex of scutellum ..... 12.

— Scutellum not infuscate, or if so only lightly on basal triangles. Tegminal markings pale orange. On *Rhamnus catharticus* and *R. frangula* ..... *E. rhamnicola* Horv. (=*rhamni* Rib. et Edwards).

12. Marking on clavus carmine-red, well developed, exactly limited exteriorly by the clavo-corial suture, its anterior margin very oblique and forming a distinct angle with the outer margin. Apical half of posterior tarsus in male always dark brown. On various trees and shrubs; in winter on evergreens ... *E. flammigera* Geoffroy (=*blandula* Rossi).

— Marking on clavus orange-red, its exterior margin remaining distinct from the clavo-cordial suture, its anterior margin less oblique, not forming a distinct angle with the outer margin. Posterior tarsi of the male often entirely pallid. On cultivated plum, cherry and wild cherry *E. pruni* Edwards.

13. Each lobe of male pygophor with a long process projecting behind from its dorsal margin and a short hooked process projecting behind and upwards from its ventral margin. Female ovipositor entirely pale; tegmen lemon-yellow; 3.9-4.3 mm. On alder and elm ..... *E. alneti* Dahlbom.

Subspecies:

On hazel, tegmen pale yellow, 3.3-3.75 mm. ..... subsp. *coryli* Tollin.

On apple, tegmen milk-white ..... subsp. *mali* Edwards.

— Each lobe of male pygophor without any process visible externally. Female ovipositor always brown or black at apex ..... 14.

14. Clavus entirely infuscate except at base *E. angustata* Leth. var. *moesta* Ferrari (=*umbrata* Mel.).

Also immature forms of *E. angustata* and *E. tiliae*.

— Clavus not infuscate ..... 15.

15. Scutellum and the internal apical cell infuscate immature *E. flammigera* and *E. pruni* Edwards.

— Scutellum pallid, not infuscate; apical dilatation of genital style in shape of a harp ... immature *E. rhamnicola* Horv. (=*rhamni* Rib. and Edwards).

Genus *Dikraneura* Hardy, 1850

(=*Dicraneura* auct. = *Erythria* Fieber, 1868 = *Dicranoneura* Dgl., 1876 = *Liguropia* Haupt, 1930).

1. *Dikraneura luteola* Fieber, 1872

1872, *Notus luteolus* Fieber, Kat. europ. Cicad.: 14.
1906, *Dicraneura luteola* Oshanin, Verz. Palaark. Hemipt., **2**: 190.
1908, *Dicraneura luteola* Edwards, *Ent. mon. Mag.*, **44**: 81.
1936, *Dicraneura luteola* Ribaut, Faun. France, **31**, Homopt. Auchen. 1, Typhlocybidae: 219.
1938, *Dikraneura luteola* China, *Ent. mon. Mag.*, **74**: 195.

There has been considerable confusion over this species. As pointed out by Edwards (1908), Fieber recorded it without description from 'Anglia.' In his monograph of the European Homoptera Fieber (*Rev. d'Ent.*, **1884**: 44) recorded it as *Erythria citrinella*. So far as I am aware, *luteolus* has never been described and is a *nomen nudum*, in spite of the fact that it is recorded as a distinct species by Puton and Oshanin in their Palaearctic Catalogues. Edwards (1908) considers that in recording *N. luteolus* from Anglia, Fieber intended *D. variata* Hardy. Ribaut also places *D. luteola* as a doubtful species but attributes it to Lethierry, 1884. Examples from the Puton collection examined by Ribaut proved to be *D. variata* Hardy. In my 1938 paper quoted above I wrongly added this species to the British list, referring to Edwards' 1908 note. I therefore propose to delete this species from the British list and to place it as a synonym of *D. variata* Hardy. No. 615A should thus be deleted.

2. *Dikraneura flavipennis* Zett., 1828.

Ribaut has shown that this species, which is the genotype of *Notus* Fieber, 1866, should be regarded as generically distinct from *Dikraneura*. He has, therefore, re-elevated *Notus* Fieber from its former status as a synonym of *Dikraneura* Hardy to full generic rank (see under). In my 1938 paper I overlooked this fact and omitted to insert the genus *Notus* Fieber as an addition with No. 610, *flavipennis* Zett., as the representative species.

Genus *Notus* Fieber, 1866
(=*Dikraneura* Hardy, part.).

1. *Notus flavipennis* (Zett., 1828).

1828, *Cicada flavipennis* Zetterstedt, Ins. Lapp.: 292.
1891, *Dicraneura armata* Buckton, Mon. Brit. Cicad., **2**: 107, t. 63, f. 3, 3a.
1936, *Notus flavipennis* Ribaut, Faun. France, **31**, Homopt. Auchen. 1, Typhlocybidae: 221.

This species, as just pointed out, has been transferred from *Dikraneura,* from which it differs in the peculiar structure of the penis, which comprises two ejaculatory canals and two genital orifices. The genitalia are figured by Ribaut.

Key to British species of *Dikraneura* and *Notus.*

1. Thick-set, less than four times as long as wide across pronotum; apical region of tegmen relatively short, the internal apical cell much less than half length of cubital cell (brachial of Edwards). Penis with a long recurrent forked appendage on each side of its apex. On *Calluna vulgaris* and *Carices* at high altitudes ... *Dikraneura aureola* Fall.
— Slender, more elongate, much more than four times as long as wide across pronotum; apical region of tegmen relatively long, the internal apical cell much longer than half the length of the cubital cell ..... 2.
2. Male ..... 3.
— Female ..... 7.
3. Subgenital plates not longer than wide, much shorter than last abdominal sternite, their apices overlapping. Penis double, that is with the ejaculatory duct bifurcate, with two separate genital orifices at the extremities of two tuberculate horn-shaped processes which viewed posteriorly form a crescent with its points approaching one another. On *Carices* .....
Notus flavipennis Zett. (=*D. armata* Buckton).
— Subgenital plates at least as long as last abdominal sternite, their apices not overlapping. Penis simple with a single duct and a single orifice ..... 4.
4. Subgenital plates elongate, more or less rod-like, widely separated from one another; genital styles coalescent with the subgenital plates ..... 5.
— Subgenital plates in ventral view in the form of elongated triangles with their inner margins in contact, at least at their bases; genital styles not coalescent with subgenital plates and easily separated from them ..... 6.
5. Inner margin of subgenital plate with a stout inwardly projecting spur a little before the apex, the subgenital plates much longer than the last abdominal sternite. On grasses in meadows and on commons .... *Dikraneura similis* Edw. (*D. fieberi* Löw).

— Inner margin of subgenital plate without a stout inwardly projecting spur below the apex ; the subgenital plates equal in length to the last abdominal sternite. On long grasses, etc., in damp woods ..... *Dikraneura citrinella* Zett. (=*D. forcipata* Flor).

6. Eye in lateral view as high as long, more suddenly declivous posteriorly. Pronotum sunk into posterior margin of head between eyes for less than half its length in the middle, slightly wider than head. Penis with a bifid horn on its dorsal side which is as large or larger than the penis itself. On Labiatae and *Ononis* on commons and waste places ..... *Dikraneura mollicula* Boh.

— Eye in lateral view much less high than long, less suddenly declivous posteriorly. Pronotum sunk into posterior margin of head between eyes for more than half its length in middle, slightly narrower than head. Penis simple, in any case without a bifid horn as large as itself. Amongst low plants and grasses in rough pastures, commons and clearings in woods ..... *Dikraneura variata* Hardy (=*D. luteola* auct.).

7. Last abdominal sternite of female at least as long in middle as at sides, its posterior margin at the same level or extending further backwards than that of the corresponding tergite as seen from below ..... 8.

— Last abdominal sternite of female shorter in middle than at sides, the posterior margin of the corresponding tergite, as seen from below, extending further backwards than that of the sternite at its middle ... *Notus flavipennis* Zett. (=*D. armatus* Buckton).

8. Last abdominal sternite in a single piece occupying the whole of the space between the ventral margins of the tergite ..... 9.

— Last ventral abdominal sternite divided into three parts by two deep longitudinal incisions, the middle part forming a rectangular or trapezoidal lobe, the side ones each having the form of a triangle of the same height as the tergite ..... 10.

9. Eye in lateral view much less high than long ; pronotum sunk into head between eyes for about half its length in the middle. Vertex forming a right angle ; head and pronotum often with a percurrent median whitish stripe rather indistinctly delimited ..... *D. variata* Hardy (=*D. luteola* auct.).

— Eye in lateral view as high as long ; pronotum sunk into head between eyes for distinctly less than half its length in middle. Vertex forming an obtuse angle ; head and pronotum always without a median longitudinal pale stripe ..... *D. mollicula* Boh.

10. Bright yellow; free sides of crown straighter; slightly smaller, the median lobe of the last abdominal sternite slightly longer ..... *D. similis* Edw.[10]
— Dirty yellow; free sides of crown less straight; slightly larger, the median lobe of the last abdominal sternite slightly shorter ..... *D. citrinella* Zett.

Genus *Empoasca* Walsh, 1864

(=*Kybos* Fieber, 1866 = *Chloria* Fieber, 1866 = *Cybus* Dgl. & Scott, 1875 = *Chlorita* Fieber, 1875).

The British species of this genus have been much confused. Since my 1938 paper (Corrections and Additions to James Edwards' Catalogue) Wagner, 1939, has confirmed that *E. butleri* Edwards is identical with *E. rufescens* Melichar, while Ossiannilsson, 1939, has shown that *E. viridula* Fall. is identical with *E. dumosa* Rib., 1933, and has re-named *E. viridula* Ribaut nec Fallen, *E. paolii*. Neither the true *E. viridula* Fall. nor *E. paolii* Oss. are definitely known to occur in Britain, although they may well do so. The genitalia of *E. viridula* figured in my 1938 paper (*Ent. mon. Mag.*, **74**: 239, text fig. 3, 8) actually represents *E. paolii* Oss. Although Edwards, 1908, was of the opinion that Marshall's 1887 British record of *Chlorita apicalis* Flor should stand, he had never seen an example, and I therefore consider that this species should be removed from the British list. Ribaut in his 1936 monograph, p. 193, considers that *E. apicalis* Flor, although recorded from France by Lethierry, Reiber, Puton and other authors, is very doubtfully a French species. He states that specimens in Puton's collection labelled *Chlorita apicalis* Flor were all females of a *Typhlocyba* species, probably *T. australis* Froggatt.

Key to British species of *Empoasca* Walsh, 1864.

1. Head rounded in front; vertex scarcely longer in middle than at sides. Usually the second apical cell of tegmen is triangular and stalked, the intermediate and external apical veins issuing from a common stem ... (*Kybos* Fieber). 2.
— Head angular in front, at least in the female. Vertex much longer in middle than at sides. Second apical cell of tegmen never stalked, usually quadrangular, the intermediate and external apical veins having a separate origin ..... (*Chlorita* Fieber). 7.
2. Male ..... 3.
— Female ..... 5.
3. Penis simple without horns. Appendages of anal collar long and slender ..... 4.

[10] The females of *D. similis* and *D. citrinella* are very difficult to separate.

— Penis with two erect horns, arising from the dorsal side of the base of its free region. On alder ..... *E. smaragdula* Fall. (=*Eupteryx viridipes* Curtis).

4. Appendage of ventral margin of lobe of pygophor longly acuminate. Usually the tegmen possesses a broad brown well-delineated stripe along the internal margin of the clavus. On *Salix repens* ..... *E. rufescens* Mel. (=*E. butleri* Edwards).

— Appendage of ventral margin of lobe of pygophor obliquely truncate at the apex, which is hollowed in the manner of a spoon. No brown stripe along the internal margin of the clavus. On poplars (*P. tremula, P. canescens* and *P. serotina*) ..... *E. populi* Edwards.

5. A brown stripe along the claval suture. Sides of the projecting part of the last abdominal segment deeply indented in the form of steps of a staircase. On alder *E. smaragdula* Fall (=*Eupteryx viridipes* Curtis).

— No brown stripe along the claval suture ..... 6.

6. Sides of projecting part of last abdominal segment deeply indented in the form of steps of a staircase. Usually a broad brown stripe down the inner margin of clavus (claval commissure). On *Salix repens* ..... *E. rufescens* Mel. (=*E. butleri* Edwards).

— Sides of projecting part of the last abdominal segment straight or slightly concave. No brown stripe down inner margin of clavus. On poplars ..... *E. populi* Edwards.

7. Median cell (suprabrachial of Edwards, 1896) of tegmen entirely unpigmented and transparent, the other cells yellowish-green at least on their basal four-fifths. Cubital vein of wing nearly always dark in colour and visible through the tegmen. Head usually with whitish markings. Horns of anal collar recurved anteriorly. On various plants, trees and shrubs; in winter shelters amongst evergreens, firs, etc. ..... *E. flavescens* F. (=*E. aurantiaca* Edw.).

— Median cell of tegmen pigmented. Green colour of tegmen uniformly distributed over corium. Cubital vein of wing colourless, invisible through tegmen. Head yellowish-green, rarely marked with white. Horns of anal collar recurved posteriorly ..... 8.

8. Appendage of ventral margin of lobe of male pygophor bearing a strong tooth on its dorsal side. Female length not more than 3.7 mm. On various plants, trees and shrubs ..... *E. pteridis* Dahlb., 1851 (=*viridula* Edwards part. = *E. tullgreni* Rib., 1933 ?=*solani* Curtis, 1846, ?=*solanituberosi* Koll., 1852).

— Appendage of ventral margin of lobe of male pygophor without a tooth on its dorsal side. Female length more

than 3.7 mm. (4 mm.). On various plants, trees and shrubs ..... *E. decipiens* Paoli
(=*viridula* Edwards nec Fall. ?=*E. solani* Curtis, ?=*E. solanituberosi* Koll.).

Genus *Alebra* Fieber, 1875

(=*Compsus* Fieber 1866, *nec* Schoenherr 1823).

Until 1936 this genus contained only one European species, *A. albostriella* Fall., 1826, with three varieties, *discicollis* H.S., *wahlbergi* Boh. and *fulveola* H.S. In 1926 McAtee (*J. New York Ent. Soc.*, **34**: 144) described a new variety from England, *A. albostriella* var. *insignita,* and at the same time placed var. *wahlbergi* Boh. as a synonym of var. *discicollis*. Ribaut, 1936 (Faun. France, **31**, Typhlocybidae: 195), however, I think correctly, regards *A. wahlbergi* as a distinct species and, according to his key to the varieties, McAtee's var. *insignita* would be but a form of the typical variety. Ribaut in a footnote states of the typical form: 'The substitution of red for yellow may only be partial; indeed it most frequently is. It always begins at the internal region of the tegmen.' As shown by Ribaut, var. *fulveola* H.S. is merely the male of *A. albostriella* Fall, the typical form being the female of the species. In the British Museum collection are specimens which belong to Rey's var. *viridis* collected by W. West at Blackheath, Kent, 8.viii.1900 and 20.ix.1901. There is also a single specimen of var. *dufouri* Rib. collected by W. West and labelled Kent and a single specimen of *A. wahlbergi* var. *pallescens* Rib. collected by myself at Leatherhead, Surrey, 27.vii.1925. These three varieties are new to the British list. I am not altogether satisfied with Ribaut's separation of var. *viridis* and the typical form, since I have seen specimens of the latter with the underside of the thorax brown. Var. *viridis* Rib. may best be distinguished by the very narrow parallel-sided whitish stripe along the clavus down the claval suture. In typical *A. albostriella* female this stripe is much wider and is not parallel-sided but narrower apically than basally.

Key to the British species, varieties and forms of *Alebra* Fieber.

1. External dorsal angle of posterior tibia with dark brown points at the tips of the bristle-bearing tubercles. Apical cells and apices of cubital and median cells of tegmen usually very distinctly infuscate. Insect between 4.25 and 4.65 times as long as wide across head. When the tegmina bear a brown transverse band, its posterior margin lies above the apex of the clavus by about one-third the length of the clavus (except in some speci-

mens of var. *dufouri* Rib.). On oak, alder and sometimes birch ..... *A. albostriella* Fall. 2.

— External dorsal angle of posterior tibia without dark brown points. Apical cells not or only very slightly infuscate. Insect between 4.8 and 5.1 times as long as wide across head. When the tegmina bear a brown transverse band, its posterior margin lies on a level with the apex of the clavus. On maple, elm, alder, lime, hazel and hawthorn, rarely on oak ..... *A. wahlbergi* Boh. 7.

2. Tegmen in part dark brown ..... 3.

— No dark brown mark on tegmen ..... 4.

3. Tegmen with a dark brown spot or transverse band on a level with the middle of the clavus, this brown mark not reaching the apex of clavus. Basal third of tegmen free of brown tint ..... *albostriella* var. *discicollis* H.S.

— Tegmen uniformly dark brown from its base almost to the apex of the clavus ..... *albostriella* var. *dufouri* Rib.

4. Tegmen uniformly dark yellow except for the infuscate apical membrane; wings infuscate ..... *albostriella* Fall., ♂ (=var.*fulveola* H.S.).

— Tegmen yellow, orange or red with two longitudinal whitish stripes, one down external (next claval suture) margin of clavus, the other down the median cell and invading the apex of the radial cell ..... 5.

5. Whitish stripe of clavus narrow and parallel sided, often invading the cubital cell across the claval suture ..... *albostriella* var. *viridis* Rey.

— Whitish stripe of clavus broader, much wider at base than apex, its outer margin seldom invading the cubital cell, if so only very slightly ..... 6.

6. Two inner longitudinal stripes of tegmen bright red, the costal coloured stripe pale yellow ..... *albostriella* var. *insignita* McAtee (=var. *rubrobivittata* Edw. M.S.).

— All three longitudinal coloured stripes of tegmen yellow or orange red ..... *albostriella*, ♀ (i.e. typical form).

7. Tegmen with a distinct brown mark or transverse band with its posterior margin level with the apex of clavus ..... *wahlbergi* Boh., typical form.

— Tegmen without brown mark or band ..... *wahlbergi* var. *pallescens* Rib.

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